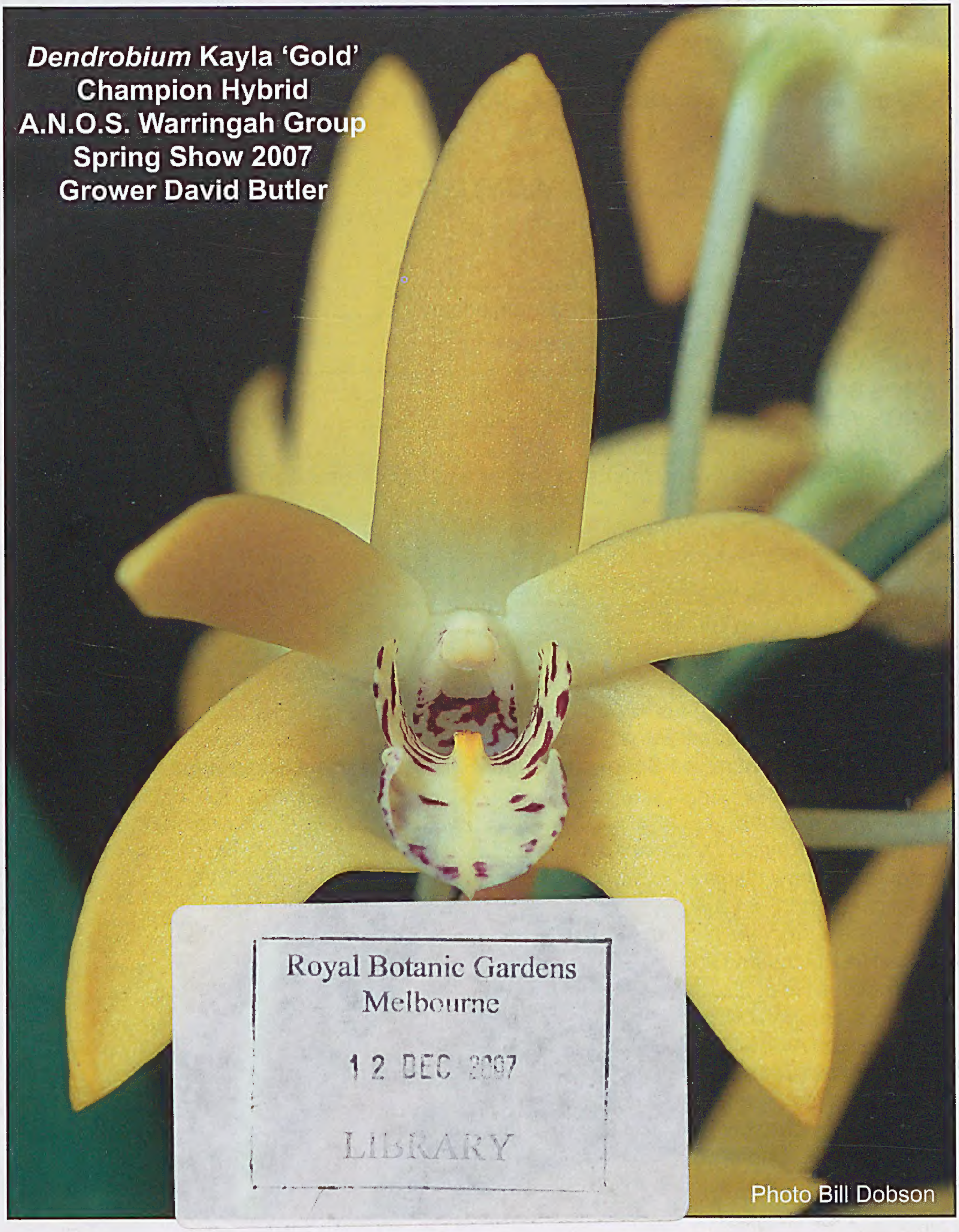
The Orchadian

Volume 15, Number 10 www.anos.org.au December 2007

Official Journal of the Australasian Native Orchid Society



Dendrobium Kayla 'Gold'
Champion Hybrid
A.N.O.S. Warringah Group
Spring Show 2007
Grower David Butler

Photo Bill Dobson

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The Orchadian

Official Journal of The Australasian Native Orchid Society Inc.
Founded August 1963

www.anos.org.au

Dedicated to the Study and Conservation of Australasian Native Orchids
Print Post Approved PP239628/00002, ISBN 0474-3342
Patron: Walter T. Upton AOM
December 2007 Volume 15 Number 10

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Editorial.

In this issue we have an interesting article on the pros and cons of the old taxonomic system and the newer genetic way. Elvi Hochguertel read this paper in the German orchid magazine *Die Orchidee*, and translated it across to English. Elvi also arranged permission with the author and *Die Orchidee* to reprint the article. A large task and I thank Elvi for the time and effort put into the translation.

There are several show reports from various Groups with pictures of their Champion Orchids. Bill Dobson, who judged at many of these shows, supplied many of the photos used in this issue and once again I thank Bill for the support he offers for this journal.

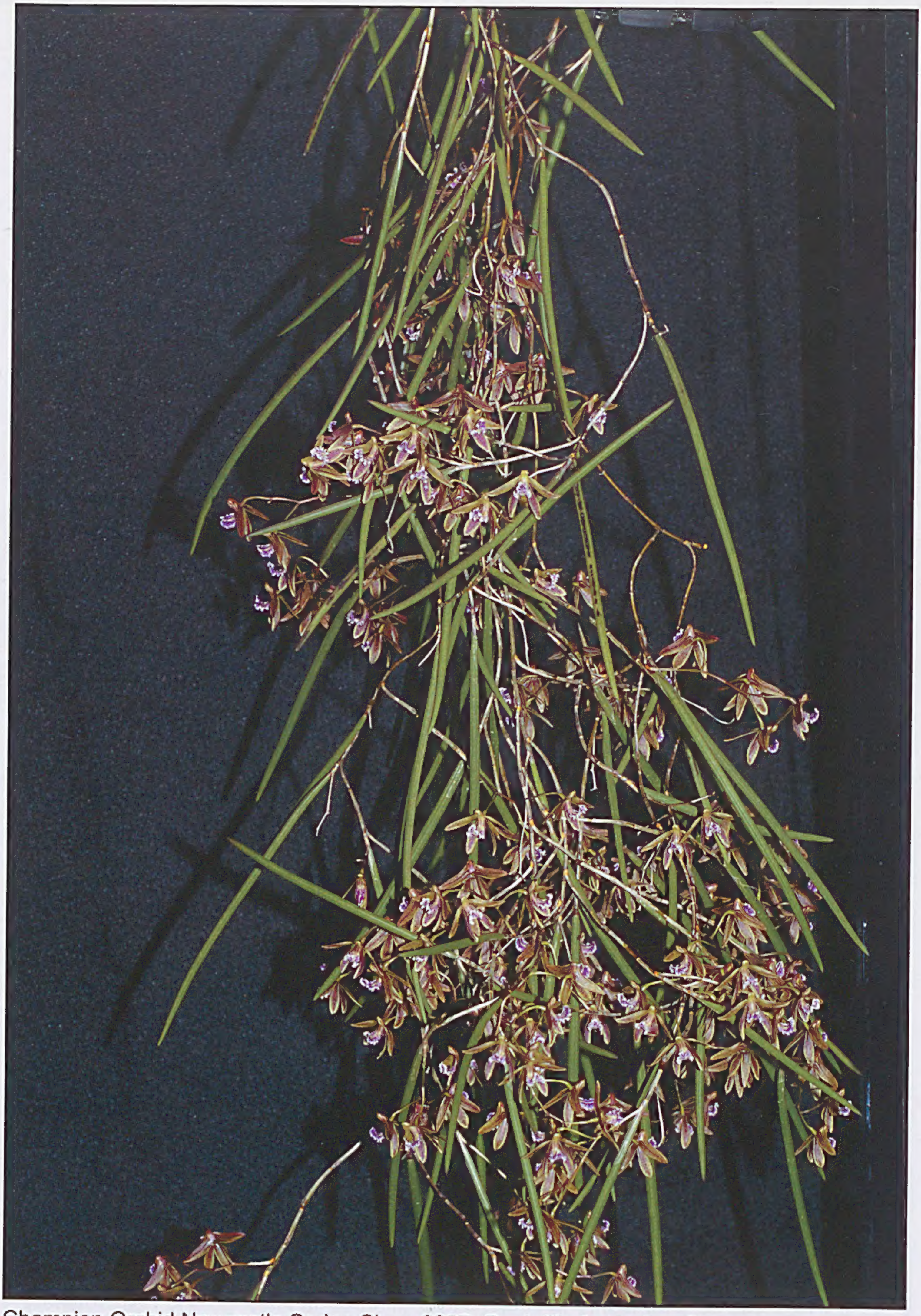
Nita Wheeler writes of the weekend we enjoyed down her way. The October long weekend has become a regular trip for some of us each year. Even though the area around Yass has endured the drought over the past four or five years, we still manage to see plenty of orchids, (even if we haven't seen any Spider Orchids).

Alan Stephenson tells us of his plight to save an endangered orchid species at Vincentia on the South Coast of New Soouth Wales, and by the looks of the photos supplied, it was just in time.

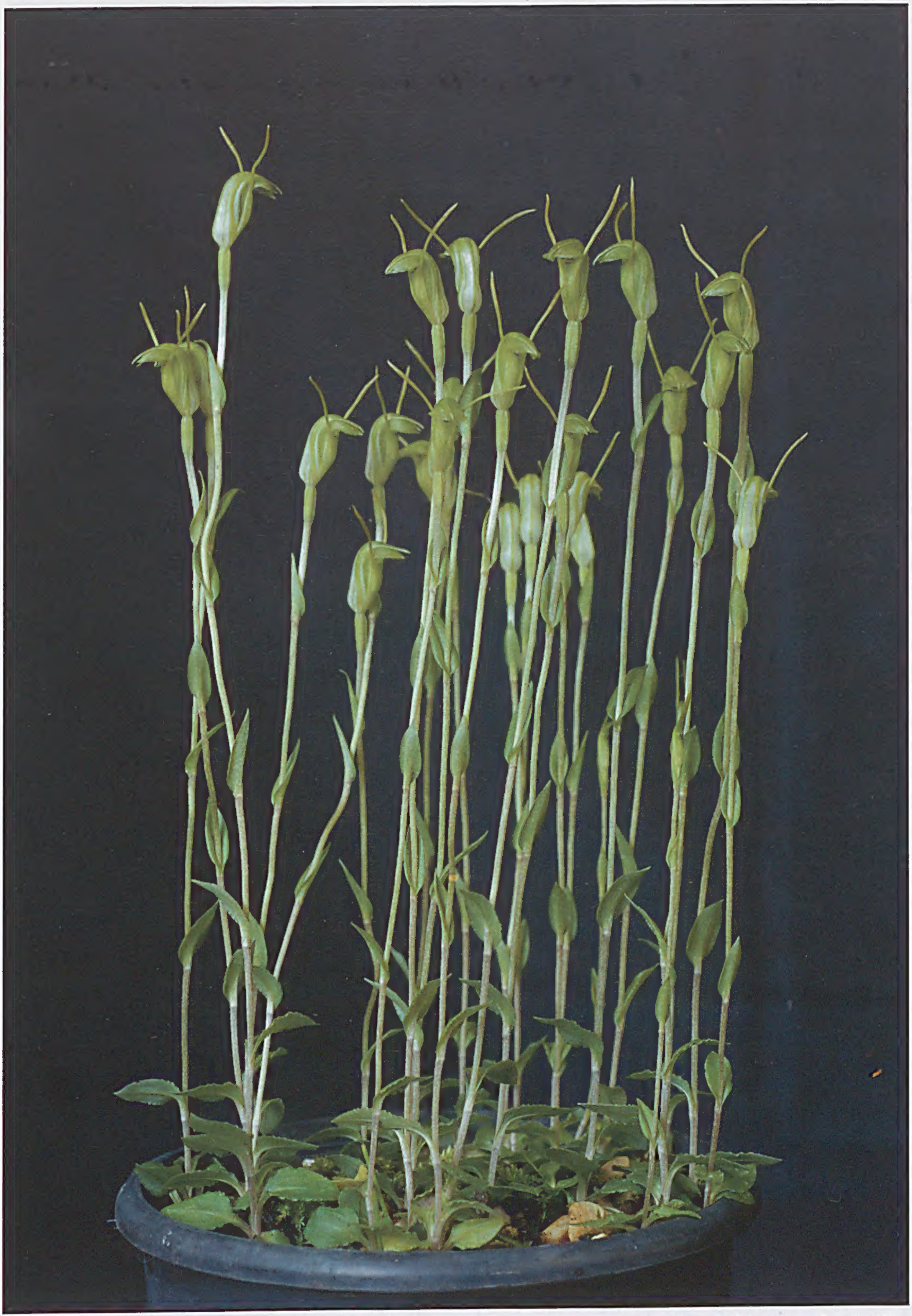
So another year is almost over and as we prepare for the festive season we also look to the year ahead and hope our orchids do better with the care we plan to do, to win that illusive Champion Prize.

So have a happy and safe holiday season and I wish you all the best for the next year, orchid wise!

Peter



Champion Orchid Newcastle Spring Show 2007, *Dockrillia* Australian Ginger.
Grower Tony Clarke
Photo Bill Dobson



Champion Orchid Warringah Spring Show 2007, *Linguella* sp. nova. Karri, Western Australia. Grower Mark Clements. Photo Bill Dobson

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Genetic Research – the affect on orchid taxonomy.

(Reprinted, with permission from *Die Orchidee* **54**[5]:573-583, 2003)

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Keywords: Taxonomy, Genetic, DNA-analysis

Summary: Recently, DNA analysis and other genetic methods have been introduced to orchid taxonomy resulting in new insights and vast changes. This essay discusses some of the difficulties and oddities that occur when scientists switch from classical taxonomy based on morphological characters to an evolutionary taxonomy based on family trees created from genetic investigations.

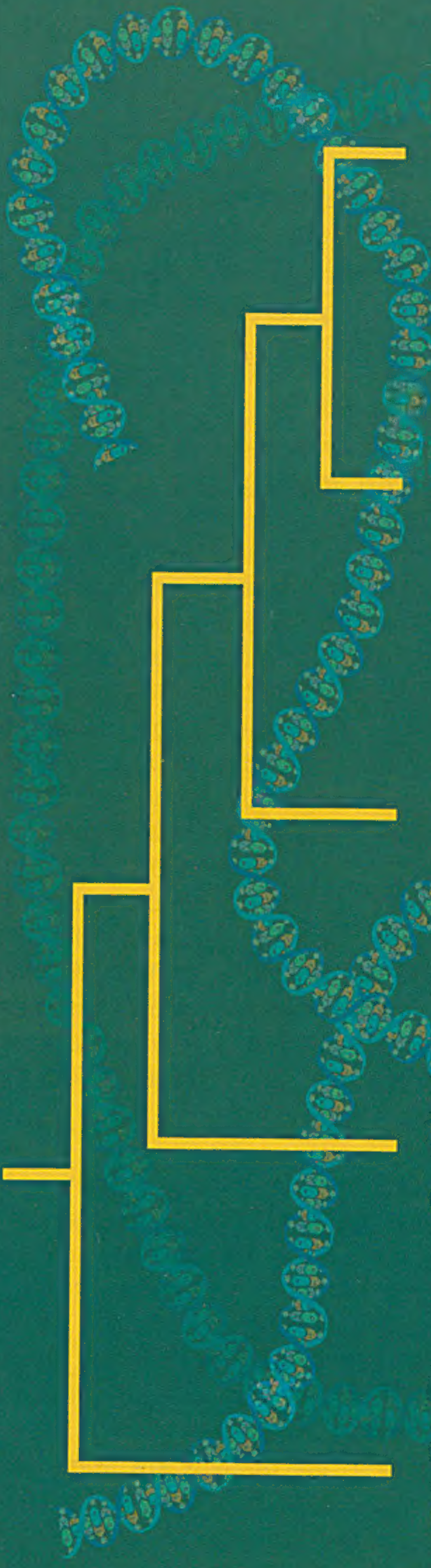
Introduction:

In the last few months, a whole range of new orchid names appeared in the literature. Behind these, hide many familiar ones that have had a home in our greenhouses, conservatories and glass cabinets for a very long time, however under quite a different name. Thus there is, for example, a *Sophronitis purpurata,* which to all of us is more familiar under the name of *Laelia purpurata*. The reason: a team of geneticists under Prof. Mark Chase in conjunction with the Royal Botanic Gardens of Kew found in their studies, that the Brazilian *Laelia* species are genetically closer related to the genus *Sophronitis* than for instance with the *Laelia* species of Mexico. Consequentially he combined all the Brazilian *Laelia* species into the *Sophronitis* alliance. Even, out of Australia a whole row of new names has come to us lately. Due to a group working under Clements and Jones from Canberra, in Australia almost all *Dendrobium* species have been renamed, so that in the whole of Australia we now only have one species of *Dendrobium* left. They also included a few *Dendrobium* species from Papua New Guinea that are of great gardening interest to us. The well-known *Dendrobium cuthbertsonii* for example, became *Maccraithea cuthbertsonii* and if you buy yourself a *Chromatotriccum lawesii,* you carry home a *Dendrobium lawesii* and can hang it next to the one already in your collection.

All these examples have one thing in common: the renaming came into being due to genetic researches. Fifty years after the solving of the DNA structure, the intellectual great-grandsons of Watson and Crick do not stop before our orchids, and it becomes more and more important that our botanists and interested amateurs occupy themselves with these things. Sometimes research of this kind produces, and not only concerning orchids, some very strange results. Thus there was, for example, a report in the "*Proceedings of the National Academy of Sciences*" which stated that humans are presumably descended from the African aardvarks. A somewhat thrilling opinion, which really means, that some parts of the human genome is very similar to that of the aardvarks, which hints to common ancestors.

Taxonomists, Geneticists and other Biologists sometimes seem to live on an unknown planet and they do not necessarily share this world with us. This may be due to a large extent, that in the majority they not only avail themselves what to us is an incomprehensible language, but that the whole subject and the basis of this, seems to lay outside the norm of the ordinary individual. In this article, I would like to simplify this unhappy condition and to explain the characteristics of Taxonomy and Genetic's, and in what way they relate to orchids. Taxonomy as well as Genetic is

modern cladistic taxonomy



Laelia
sect. *Cattleyodes*
(Laelia purpurata)

Laelia
sect. *Hadrolaelia*
(*Laelia pumila*)

Cattleya maxima

Sophronitis
(*coccinea*-group)
(*Sophronitis*
brevipedunculata)

Laelia
sect. *Parviflorae*
(*Laelia cinnabarina*)

(all fotographs by Greg Allikas
http://www.orchidworks.com)

lastly not as withdrawn as they seem and certainly have ordinary aspects.

Taxonomy – a dry subject?

The human being is actually an orderly creature. OK, that does not apply to my desk. Nevertheless, a good filing system and a good overall view of things made life easier even for our earlier ancestors.

Originally, it was only important to divide the environment into simple categories: for example "can eat me", "can I eat it" or "can't eat me and tastes horrible". With the development of our language, the filing-system became more and more complicated. Added, was the possibility to communicate with people from far away, which spoke a different language. Therefore, over the centuries, Latin and Old-Greek became the language of the sciences, not least, as these languages did not change anymore and the root of these sciences lie in the writings of old Greece and the Roman Church, (respectively Monasteries).

In many instances the names and concepts, especially of the natural sciences are exact descriptions. A plant very well known to us all (at least in Europe) for instance, had the name: *Cyclamen orbiculato folio inferne purpurascente* [Casper BAUMANN 1560-1624]. This name translated means: "round earth disk, with underside of leaves with a reddish hue", and was for those times a very short description. Today, this plant has the botanical name of *Cyclamen europaeum* and is today growing on nearly every windowsill in Germany. While overall the natural sciences were together with astrology and alchemy and considered as witchcraft in the middle - ages, botany was part of medicine and so had over the years a practical reflection in taxonomy. Names were supposed to be clear, simple and systematic. The system that is still valid today fulfills all of these requirements and attributed to the Swedish botanist Carl von Linne. He laid the ground stone for this in his works "*Systema naturae*", "*Genera plantarum*" and "*Species plantarum*".

On these groundbreaking works, the valid system of Genera and Species in use today is based. At that time, the first orchids also got their botanical names. All epiphytic orchids were catalogued by Linne under the *Epidendrum* category, as he only had very limited information to go by. So that at that time we had already an *Epidendrum amabile*, but known today as *Phalaenopsis amabilis.*

The start of the Binary Nomenclature, the naming based on the giving of two names, was a considerable progress. The basis of today's taxonomy is the attempt to put the many genera into a strong hierarchical system of order. In that way, you pack several genera with a common feature into a box and label "Tribus" (=tribe). Several of those boxes whose contents have common features are stored in a drawer and labeled "Familia" (=family). This drawer finds itself with many others in a cupboard which right at the top is marked 'plant world'. If one drawer or one box becomes too cluttered, you just reorganize the contents into smaller boxes. Along these lines, a family can have several sub families, or a tribe several sub tribes. Large genera contain subgenera and when these become too untidy, you section them off. The result should be to have handy and clear groups with common features. When finding a new species by using their features, you should be able to find the drawer and box into which they belong.

Sometimes, an attempt is made to depict these into a kind of tree structure, comprising of spreading branches that get wider and wider. However, this comparison does not completely hit the core of the matter. Evidently, this system of arranging things suggests that it is a kind of family tree, which it is not. A family tree shows who is descended from whom. The Linnean system cannot claim that. The features that make a group of plants into a family, do not necessarily relate to a common ancestor. Sometimes plants that have common features due to environmental conditions, also find themselves grouped together. Since taxonomists can only rely on morphological features due to usually only dry herbarium material being available for them to work with it can happen that plants end up in the wrong drawer instead of the one they belong in. The making of a family tree is really the domain of a geneticist and a lot of the confusion and the mistakes that are happening today are preventable by not mixing the drawer system and the family tree system together. I will talk about this in detail later on.

You may have gotten the idea that taxonomy is only the storing and sorting of dry plant material into boxes and drawers. Even though you cannot quite deny this, taxonomy also has its human sides. In the end, it is an activity used by people, in some instances by very humane people with human failings. Not always is science put into the foreground and many a plant owes its name and status to typical human endeavours, such as envy, prestige or even bribery and so plants were named after famous celebrities or generous sponsors. Many a race to be first in the naming or renaming of a plant is as common today as it was in years gone by, where everyone wants to be quicker than their opponents because only the first naming of a plant is valid. Rumour has it, that Reichenbach for instance named the genera Aa only, as to be always the first name to appear in any orchid genera listings, a coup that must have annoyed his closest rival John Lindley considerably. (Well, it's only a rumour, as the genus was named after Pieter van der Aa, a plants man from the Netherlands.)

Even today, you cannot quite shake the feeling that the naming or renaming of a few new genera and new species were done only, as the author needed an urgent publication for his work. In today's times of the worldwide close household system of research and science the motto is "Publish or Perish", especially if the financing of expensive laboratory equipment, through sponsorship or research funding, is dependant on the number of articles published. The institute's budget and government research funds usually just cover the office expenses for buying pencils and paper.

The difficulty for the outsider is to distinguish the differences between the serious scientist and the one that is a quick shoot expert due to financial and commercial pressures.

Modern Times

Not all these things make it easy for the hobby botanist to find a way through this taxonomic jungle. To this is added, that especially in the last 20 years in taxonomy the basic trend seems to be the bringing of a few shifts and changes. You have to remember that the taxonomy as well as other sciences takes over new impulses from other branches of the natural sciences and of course new knowledge, which leads to new systems and assessments.

When Carl von Linne, Olaf Swartz and many other botanists began their pioneer work in taxonomy, they only had a limited knowledge at their disposal. Accordingly, they kept their work system relatively simple; their system was also to portray the creation by god. That is why the drawer system, that I previously explained, was adequate. In the course of time, not only was new knowledge added, but new demands as well. Since through the work of Charles Darwin and his successors, evolution was a dynamic concept of development in genera which also found its way into biology, it was only right, that it had to be taken up by taxonomists into their field. More and more should the system set up by taxonomists not only show a natural illustration of the relationship between the genera and the species but should also reflect the family connections in this. The wonder word now reads "Cladistics". Cladistics is the theory of the family connections between the genera. This is all about the belief that over a long period, one species through evolutionary processes brings forth new species, which adapt to the special environmental conditions. Today's species are the end-building blocks to a family tree (Cladogram). Species that are living together have a common ancestor from which they individually developed.

Somewhere at the beginning, at the root of the cladogram is the place of the common ancestor of all the species included in this family tree.

The cladistics had its beginning in 1950 by Will Hennig who started it. First off, the morphological features formed the groundwork, as well as in the classical system. With the development of gene analyses, it gave the genetics [especially over the last few years], entry into the taxonomy. The difficulty that this brings has its origin in that, figuratively speaking the new family trees do not fit any more into the old drawers of the classical system.

Just imagine that you want to build a new bookshelf for the last few years' publications of "*The Orchadian*" and to fix it you need a specific size of screws. Therefore, you go to your nearest hardware store, to the isle that houses all screws and find them hanging on the wall nicely sorted into their sizes. All accept the size, you want, because two sizes down from the ones you need; they have started to sort the screws by the different materials and not by size. In one section, you find all brass screws, in the next one all steel etc. You get quite angry and complain to the salesperson. He will shrug his shoulders and explain that he has not quite finished sorting everything out. The orchid enthusiast finds himself in the position as customer and the taxonomist in the position as salesperson. For quite some time now, we have been getting changes in the principle of order. The old inherited "drawer system" is now replaced by a modern one based on the evolution build system, - and this change takes its time.

Whether the achieved results are really the be all and end all waits to be seen. Even in the natural sciences, we have fashion phenomenon and much that used to be 'in' once, today is completely 'out'. The results are in every case surely not always easily mediated. Not many will have the idea, just by looking at this plant to put *Laelia purpurata* and *Sophronitis coccinea* into the same genus. With this nevertheless, one is a prisoner to the old drawer way of thinking. Everybody knows the Yorkshire Terrier and the St. Bernhard. These two so different looking dogs belong zoologically to the same species. Why should we not have something similar in the plant kingdom?

Order criteria for taxonomy – a matter of opinion?

To establish order, one has to think, to what factor one wants to sort things. Taxonomy is based on certain key elements that have taxonomic groups in common or else distinguish from each other. At the beginning, these were predominantly morphological features such as the growth habit, leaf structure, number and structure of blossom leaves etc. The reason for this was, that these features were easy to observe and easy to describe, plus the fact that these features were also to be found in dry herbarium material. That's the reason why colour doesn't count in taxonomy: it fades in herbarium specimens. Taxonomists were usually "desk experts" that described either fresh or herbarium plants or plant parts and build a system of the plant out of this, that really only charted an inventory. In times gone past, you had the foolproof dogma of gods' creation and one held the belief that all life forms, as we see them today, god created and therefore in no way changed.

The morphology as the foundation of taxonomy is even today very widespread. There is one difficulty, which you understand at once, if you look for example at the flowers of a *Cattleya* in comparison to a *Vanilla* or an *Arundina* or a *Sobralia*. All these flowers look as alike as two peas in a pod. The reason, all are dependent on similar pollinators and have adapted accordingly to these. The pollinators, namely bees and wasps, are found all over the world and have the same preferences everywhere. You call these same direction developments; convergent gene adaptations. The morphological features are very similar but the plants are not related to each other. In reverse, related species can look completely different if they have adapted to specific growing conditions. This you can clearly see in an example between the species *Bulbophyllum* and *Dendrobium*. In both genera, you find completely different flower forms according to which pollinator the plant has adapted too.

A system mainly built on morphological features has clearly a weakness, because the convergent gene development – or rather any kind of development is ignored. Therefore, it can be relatively easy to organize, because the features are easy to see and describe. However, there are also alternative methods that are supported by other features. For example, scent plays a main role in the pollination of the *Gongora* and the *Stanhopea*. The different composition of the fragrance, to which the pollinators react, makes sure that there are "unseen genus limits", it prevents a mix of genes for the different populations. Nevertheless, the plants can look morphologically the same. They are distinguished through the chemical analyses of the scent.

Birds and insects have a different spectrum of sight compared to humans and there are features, which we cannot discern, that possibly play a role in the pollination. Birds for instance differentiate a lot more between reds-, orange- and yellow-hues than humans do, however birds are almost blind to the colours of blue and violet. Insects by comparison see the ultraviolet colour spectrum and can perceive polarised light, which we for instance cannot see at all. To an insect, a dandelion looks completely different than it does to us. If one builds taxonomy on the pollination ecology, one has to consider all these things. These features are very hard to see and to describe.

There have also been other approaches to works of taxonomy. As an example, a system was built that worked on the structure of orchid seed or with the aid of form and count of chromosomes. These key elements also withdraw from the direct observation and make the classification of a species very difficult. Lately the geneticists have given us a further point of view. They put the genetic relationship as a centre of attention and state, with tongue in cheek that their system is in reality, wisdoms last conclusion. Here too, one cannot directly observe the features, the DNA sequences. Instead, one needs a special laboratory with the appropriate equipment and with this the expertise for this method and the assessment of the results.

This method has evidently its advantages. The observed sequences are nearly independent of outside influences; the method is reproducible and provided that the right equipment is available, relative quick to apply to a large number of single specimens. A further advantage, which indeed currently is only rarely played off, is the large number of observable features. Normally one should always have, as many features at one's disposal as there are testable taxa. The larger the number of key features is that you can fall back on; the more reliable is the allocation. As explained later on, there is though a light discrepancy between theory and practice, as generally the exploration of the geneticists supports only one or two fields of the genetics.

When is a species a species?

As stated, there are many possibilities to establish a system of order and one can orientate oneself on entirely different features. However, the question is not dependent on which key feature is being used, but whether a group of plants is put as one species, or if for example, it conceives the status of sub species, a variety or a forma. The assessment of the status depends on two things. On the one hand, the number and the assessment of the features naturally play a role. On the other hand also justified in the strategy lays the basic tendency to divide or integrate. When you examine a group of plants with an eye to common features, one is automatically in the process, rather to integrate than to divide. If on the other hand one searches for distinguishing features, one is on the best way to divide a plant group.

In taxonomy, there are to that effect two groups of people. Some get the nickname "splitter" and are inclined to create a great number of species. Others labeled "lumper" are inclined to throw everything into one pot. Mostly these nicknames are only used in the absence of the ones so called (even scientists like to talk behind their colleagues back), otherwise one risks endless discussions. The question is actually, from when one talks of one species, not to generalize. To understand that, you have to bear in mind, that for lots of plant groups the species building is not yet completed, that the evolution is not a process that has the aim of building a new species, but an always enduring adaptation to changing environmental conditions.

"Slow" and "Quick" Evolution

One believed for a long time, that the evolution is a constantly resulting development process. In the meantime, more and more botanists attain the realization that the velocity, at which the evolution proceeds, depends strongly on the general framework. There are stable biotopes, in which the species barely change. The natural choice favoured in these ecosystems, which have been partially stable for million of years, and in that all living things optimally adapted to, especially those, that deviate only a little from their inherited genetics. The large rain forests of Central Africa or South America belong to this, equally as well as New Zealand or New Caledonia. Quite often one will find plants and animals here, which perished elsewhere ages ago, e.g. the tree ferns of New Caledonia. New species seldom form due to segregation of a prime tribe into one or more new branches; one mainly observes only dilatory, linear resulting transitions.

Other biotopes are just evolving now. Here in a very short time a large number of unoccupied ecological niches can form, that give newly evolved species development possibilities. Here evolution develops in a breathtaking tempo. The number of species literally explodes and the variation between the individual plant groups is hard to distinguish. This is simply because the plants have not yet differentiated their development of that of their forebears. One of the best known examples of just such a resulting process, at which out of one tribe-form several new species develop, are the so called "Darwin Finches". When a few dripping wet finches were swept onto the Galapagos Islands, they found an abundance of new biotopes and unoccupied ecological niches. Within, seen from an evolution biological point of view, a short time out of one principal form a few dozen different new species developed. This process is designated as "adaptive radiation".

According to this, New Guinea and the Andes region are areas of special interest regarding orchids. New Guinea is geologically quite young. When the Australian Continental plate came closer to the Asiatic plates round about 15 million years ago, New Guinea emerged out of the ocean, the same as a fold in a tablecloth that was pushed together from two sides. This is how the Central Mountains evolved, where a lot of the cool growing Dendrobiums hail from. Even today, these mountains grow several cm. per year, while Australia moves furthermore north. Into this new biotope migrated for example a few Denrobiums from the Asiatic Continent, which inhabited the many new developing biotopes. This process is still ongoing even today, and that is, that the species growing here are partially closely related to each other. As examples of this, *Dendrobium glomeratum* and *Dendrobium* sulawesiense are quoted here. *Dendrobium glomeratum* grows on the Molucca Islands while *Dendrobium sulawesiense* occur on Sulawesi. When the latter species, was described in 1997, it seemed apparent for reason of the flower form and size that it had to be a new species. In the meantime, several plants have been discovered whose size and form lies between both species mentioned above. Ed de Vogel and Andre Schuitemann from the herbarium in Leiden, for this reason think that this is a rightvariable species. (Verbal communication) I myself now lean therefore, to keep the two species apart, until I have more information to go on. Although it is entirely possible, that both species could then be combined and that all plants known as *Dendrobium sulawesiense* will then be *Dendrobium glomeratum*. Only a more detailed research of further material will be able to proof that.

De Vogel and Schuitemann realised while gathering data for their CD "Flora Malesiana II", that in the genus *Dendrobium* some transitional forms exist between the sections *Calytrochilus, Pedilonum, Oxyglossum and Cuthbertsonia,* and integrated all the species of these sections under the "collecting system" of *Pedilonum*. Even though their argumentation is easy to retrace and one cannot evade the clarity of their evidence, this means that the section *Pedilonum* has a great number of species assigned to it. As the *Dendrobium* through the division of sections was to achieve more clarity, it remains to be seen whether one cannot live better with a few "in between forms", which are not definite classifications of one section, than with a large "collected section".

These examples show clearly, that it can be difficult, to correctly assign the genus – status. The geneticists promise herewith, that their methods can simplify that decision. To be able to judge how helpful the genetics really is, one has to foremost familiarize oneself with the bases.

'Classic' meets 'Modern'

Whereas taxonomy and systematic belong to the oldest branches of biology, genetics is one of the youngest members in this family. It is just about 50 years ago that the double - Helix structure (discovered shortly before) of the DNA was identified and gave with that the first shot for a rapid development in this science. As so often, it brought high expectations and just as often with the passing of time that a lot of these expectations would not be so quickly fulfilled. We can heal despite, fulsome promises and grandiose prognoses, only a few genetic conditioned sicknesses, still cannot feed the worlds population sufficiently and [thank god] are not able to determine whether our children should resemble Albert Einstein or Arnold Schwarzenegger. However, geneticists are in no way to be accused as charlatans because of this and the worthiness of the genetics is undisputable. This also applies [and especially] for the taxonomy.

This lays simply in, that we can be sure to recognise the letters in which the "book of life" is written, but we are barely able to recognise where a word begins and where it ends. The meaning of this, which is written there, one cannot yet recognise. However, the possibility alone, to be able to compare single "lines", brings us already many new perceptions.

The genetic "Alphabet Soup"

While our alphabet has 26 letters, the genetic code only possesses four basic signs. These four letters, [chemically looked at] are the four bases Adenine, Cytosine, Guanine and Thymine. The bases are connected over a sugar molecule and a phosphor acid basic framework strung to a long chain. If this sugar molecule consists of Ribose, this chain is called RNA (Ribonucleic acid), if it consists of Desoxyribose, a sugar chemically derived from it; it is called DNA (Deoxyribonucleic acid). The bases are not only aligned on one side of the sugar molecule; they can also combine on the opposite side with another base. So are Adenine combined with Thymine and Guanine with Cytosine. In this way, a kind of rope ladder develops, in that the base pairs are the rungs and the sugar - and phosphoric acid molecules are the strands, with which the rungs are knotted together. This rope ladder winds around itself like a spiral and builds the famous "Double Helix", which Watson and Crick described in the year 1953.

With this, we have the ground structure of the genetic material, so to say, the letters and lines. How does this now become a meaningful text? With this one has to know, that the basis of all life, all processes within a cell, which have to do with metabolism, increases and motion, are based on proteins and that the genetic plan is nothing more than the building plan, after which the proteins are put together. Proteins consist of Amino acids, and the DNA determines the sequence in which the Amino acids are fitted together to a protein. There are altogether 21 of such Amino acids, and one group of three bases stands for such an amino acid. Therefore, the sequence of the bases determines the building block of the proteins.

A protein can consist of several sub units and the sequence of the bases, which the sequence of the Amino acid codes for such a sub unit [or a complete protein], is called a "gene".

One can clear up the matter with the following picture: The bases build the letters, which are fitted with three letters together to form a syllable. Several syllables form a word that stand for a protein. Several words fitted together form a sentence, in which the proteins that are listed together carry out a particular process in the cell, e.g. the construction of the peculiar cell substances or the decomposition of nutriment.

With algae, all higher plant life and animals the DNA resides mostly in the cell nucleus. Beside this, there are also other sources for DNA and RNA.

Genetic material – not only in the cell nucleus

Even then, in the ancient soup in that life started, it was about "eat and be eaten". Consequently, a few cells that already held a cell core assimilated bacteria, which did not have one available. These were however, for reasons unknown today not digested, but continued to live within the cell. The cell nourished them and they in turn handed over metabolic material. In the course of time, these special bacteria took up particular tasks for the cell and symbiotic relationships formed. Out of these "Endosymbionts" developed by animals and plant cells the so-called Mitochondria originated, which are responsible in all organisms for their energy generation. The plant cells had at one time also assimilated an early form of blue green bacteria [Cyanobacteria], which were capable of photosynthesis and out of which later became the Chloroplast.

Mitochondria and Chloroplastin likewise also hold DNA and RNA. This genetic material has only relatively little change with the actual genetic material of the cell, which is stored within the cell nucleus. Nevertheless especially geneticists like to use this, because a lot more copies are available from this. A cell has many hundreds of Mitochondria and Chloroplast, but only one cell nucleus. That is why there are so many copies of Mitochondria- and Chloroplast-RNA.

How to catch a gene and to juggle with bases

To be able to analyse the genetic material, it first has to be isolated. For that, there are several standard-methods available, depending on, which form of DNA or RNA is to be gained. Next obstacle is to fish the particular piece out of the prepared DNA/RNA that one wants to work with. That means, out of a thick book with thousands of sentences, the one sentence that is wanted has to be found. (Sounds a little bit like fishing in muddy water.) For this, the long DNA rope is cut into manageable pieces. Special enzymes are used as molecular "scissors", that can find certain recognisable spots on the DNA and then split them up. From this gene cocktail, the right piece has to be grabbed. One method to achieve this is the use of monoclonal antibodies, which "recognise" a certain gene structure and hold on to it. The so marked pieces can be isolated out of this DNA cocktail in various ways.

Now the scientist has a tiny amount of DNA in his glass tube. To be able to work with this it has to be multiplied. Since recent times, there is a standard method for this too, the so-called PCR-method, PCR= Polymerase-chain-reaction, a sort of chain reaction, in that one first creates one copy, then from every copy again one more etc. ; one duplicates with every action the number of the DNA-molecules and obtains quickly a large number of copies.

Gained an amount of DNA large enough in this way, one can determine the sequence of a single base with a further standard method. This happens, more or less automatically, in a mechanical way, in that one undertakes a sequence of chemical reactions on the DNA and so one base after the other is split off and singly analysed.

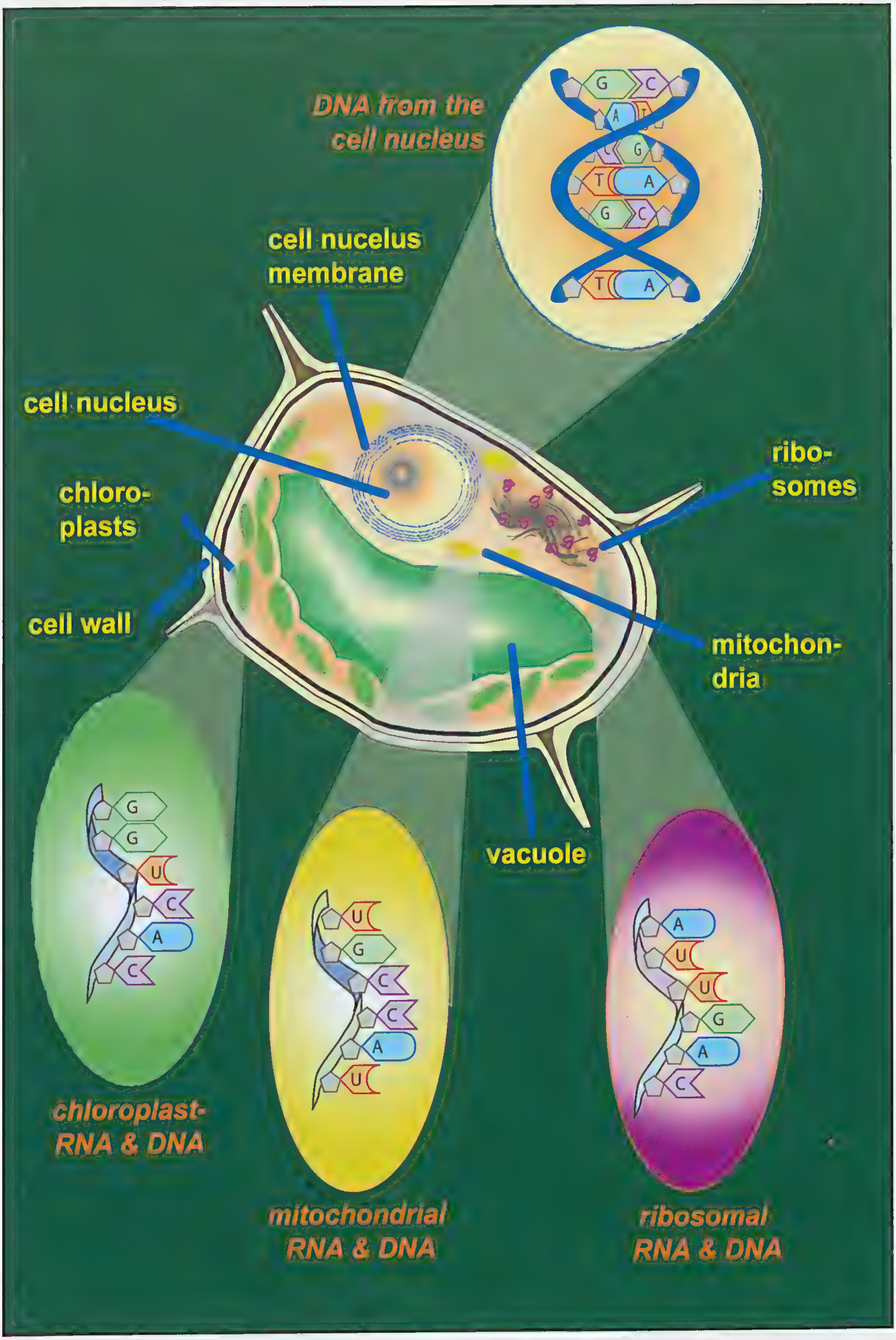
"Sequence-Salad" and the "Art of Mathemagic"

Provided that there is the right laboratory equipment at ones disposal, one can also, in a very short time research the genetic material of countless sources in this way and gain a huge amount of data. As the sequences by themselves are not particularly noteworthy and even the sheer mass of data is also difficult to assess, for further steps computers are used. With that, first the sequences of the different sources are relocated against each other, until an as large as possible number of agreements is found. Under these circumstances, empty spaces have to be inserted at some places, to achieve this. Out of these attained and "aligned" sequences, data sentences are then made, in which one can read the changes between the sequences. The more common factors exist between two sequences; the closer related they are to each other. For this comparison is made between each sequence with each other within a group and with a sequence, which is an "extensively" possible relative to the others "out-group sequence". In many articles repeatedly the two terms "parsimony" and "jack knife" can be read describing evaluation methods. With these two mathematic and technical programmed methods, the degree of agreement within a group of sequences can be determined. With this family trees out of the "out group sequence" of the existing sequences are produced per computer-program and evaluated. Simply stated: The less the changes that have to be made for a possible family tree, the more probable it is, that it will present the real circumstances.

Hooks and Eyes

The methods introduced here no doubt lead to a series of interesting results, but also hide a few possible mistake-sources, about which everybody should be aware of. First, one should ask oneself after reading the relevant publications, what source the analysed DNA came from. Actually, one should, to be safe with such researches, limit oneself to the genetic material out of the cell nucleus, because only this really belongs to the cell. For pure practical reasons, there is a tendency with a taxonomic aim in sight, to use Chloroplast-DNA, as for example out of the matK-gene. Strictly speaking, this is a material, taken out of an "Endosymbiont" and not out of the gene pool of a cell. Even though geneticists repeatedly assure us, that the research out of matK genes, are quite outstanding in comparison with the chromosomal DNA, the DNA out of the chloroplast is simply exposed to a completely different selection-process and the relatively remote environmental influences that for instance steer the evolution of the whole plant. The question, if one can ask, on research of genetic material that lies outside the cell nucleus and draw conclusions on the relationship degree of the plants, is at present not yet completely and clearly answered. (It's a little bit like using intestinal bacteria to build up a family tree.)

A further point, which makes the judgment of results obtained from genetic research difficult, is the universal application of standard methods. Sure one reaches a comparison of the results with this, that otherwise would be impossible. However, if one for instance uses monoclonal antibodies against the ITS (Internal Transcribed Spacer)-gene in an in-between step to enrich the DNA, how far will this method unselect possible ITS- sequences that


DNA from the cell nucleus
G
C
A
T
C
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T
A
G
C
T
A
cell nucelus membrane
cell nucleus
chloro-plasts
cell wall
ribo-somes
mitochon-dria
vacuole
G
G
U
C
A
C
chloroplast-RNA & DNA
U
G
C
C
A
U
mitochondrial RNA & DNA
A
U
U
G
A
C
ribosomal RNA & DNA

have only a limited degree of matches with one another? This is a question, which is relevant to every enrichment process that is based on the detection of key-sequences or key-structures. If the similarity moves below a certain degree, there is the danger to discard material through this method that could lead to a quite different result?

Finally, there is one more point, which no one in umpteen discussions could refute to my satisfaction. Many of the researches solely obtain the analyses of one gene respectively of one DNA sequence, for instance ITS or matK. However, what if the most important differences between the researched plants is not situated in this gene or in this sequence, but are found in a completely different area of the genetic material? If one limits oneself to only one gene, does one not put oneself into the danger, to research a feature that is not relevant to the formation of a new species?

End-summery

Despite the queries raised herein, the genetic analysis is surely a useful tool for taxonomy, but only if it is used in the right context. So are for instance, some interesting new findings produced, of the historic-evolutionary age of the orchids as a plant family. In that way orchids, even if they are still in a state of process of the formation of new species, are by no means as young as previously thought. As a plant group, their origins surely go back more than 90 millions years, and the ancestors of today's orchids experienced the birth and death of the dinosaurs. This was discovered in the comparison of the genetic material within certain palm groups, of which data based fossils were found. This is supported by plant-geographical results, because the mainly southern hemisphere occurring Epidendreae, to which the south- and central American Epidendreae, Laelias and Cattleyas are reckoned as well as the Asiatic Dendrobiums and the African and Asiatic Bulbophyllums, descended presumably from one living plant group on the ancient continent Gondwanaland, that after the separation of south America, Africa, Australia and the Indian subcontinent from the Antarctic plate developed into the present-day plant-groups. This division into today's continents happened in the time just over 90 million years ago.

Even the clarification of the relationships of the different orchid tribes is an important result based on the genetic researches, which resulted in important improvements of our knowledge in this area. However it comes repeatedly to "strange" results (see *Sophronitis purpuata*), when the "genetic distance" of the researched objects becomes too narrow. One possibly has to be able to make statements on the level of Genera, Subgenera, Sections or even Species for further progress. Until then a *Sophronitis purpurata* for me personally remains a *Laelia purpurata* and a *Maccraithea cuthbertsonii* a *Dendrobium cuthbertsonii.*

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All pictures and drawings are by the author.
Translated from German by Elvire Hochguertel and revised by Dr. J. Erfkamp.

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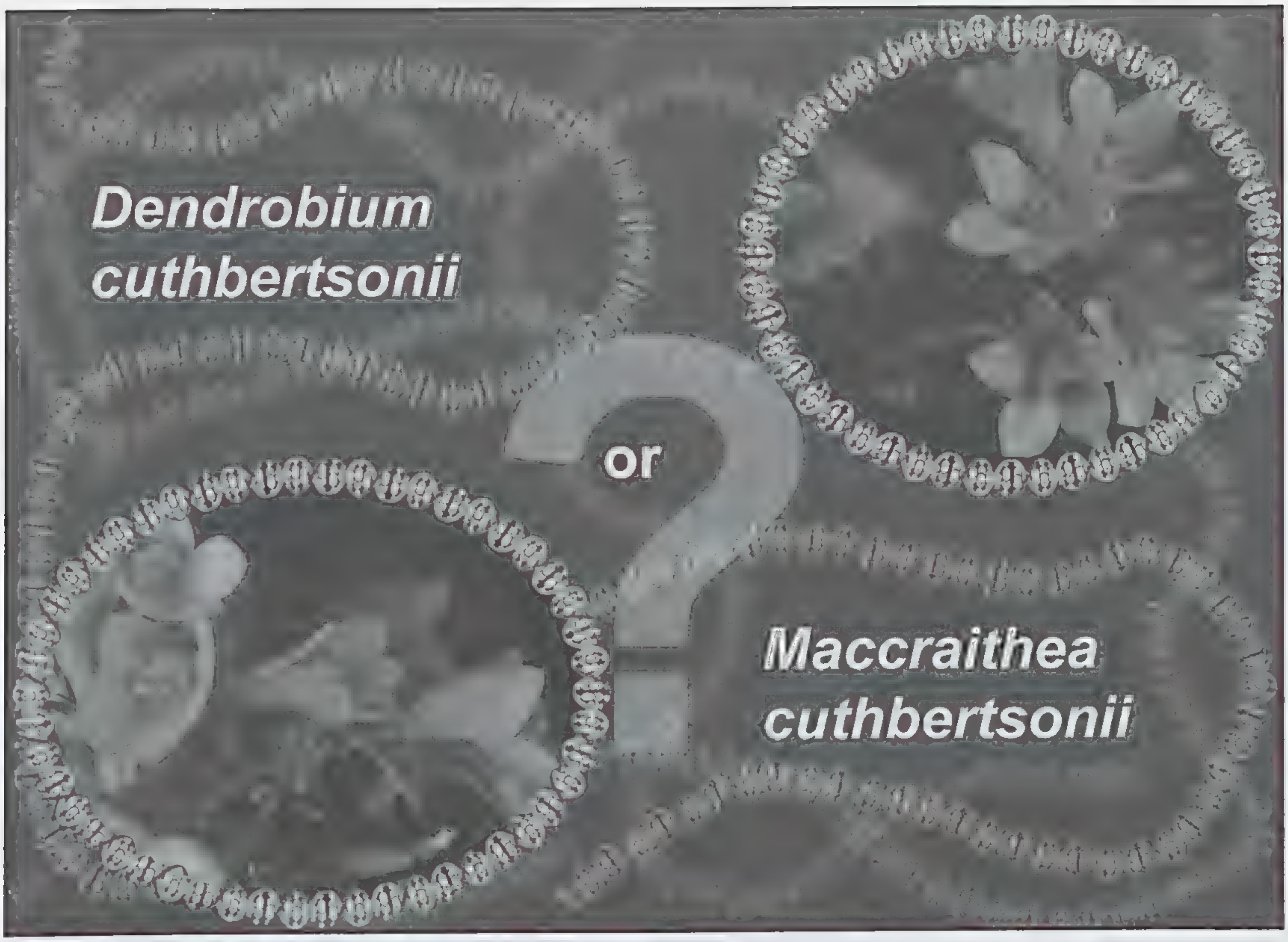


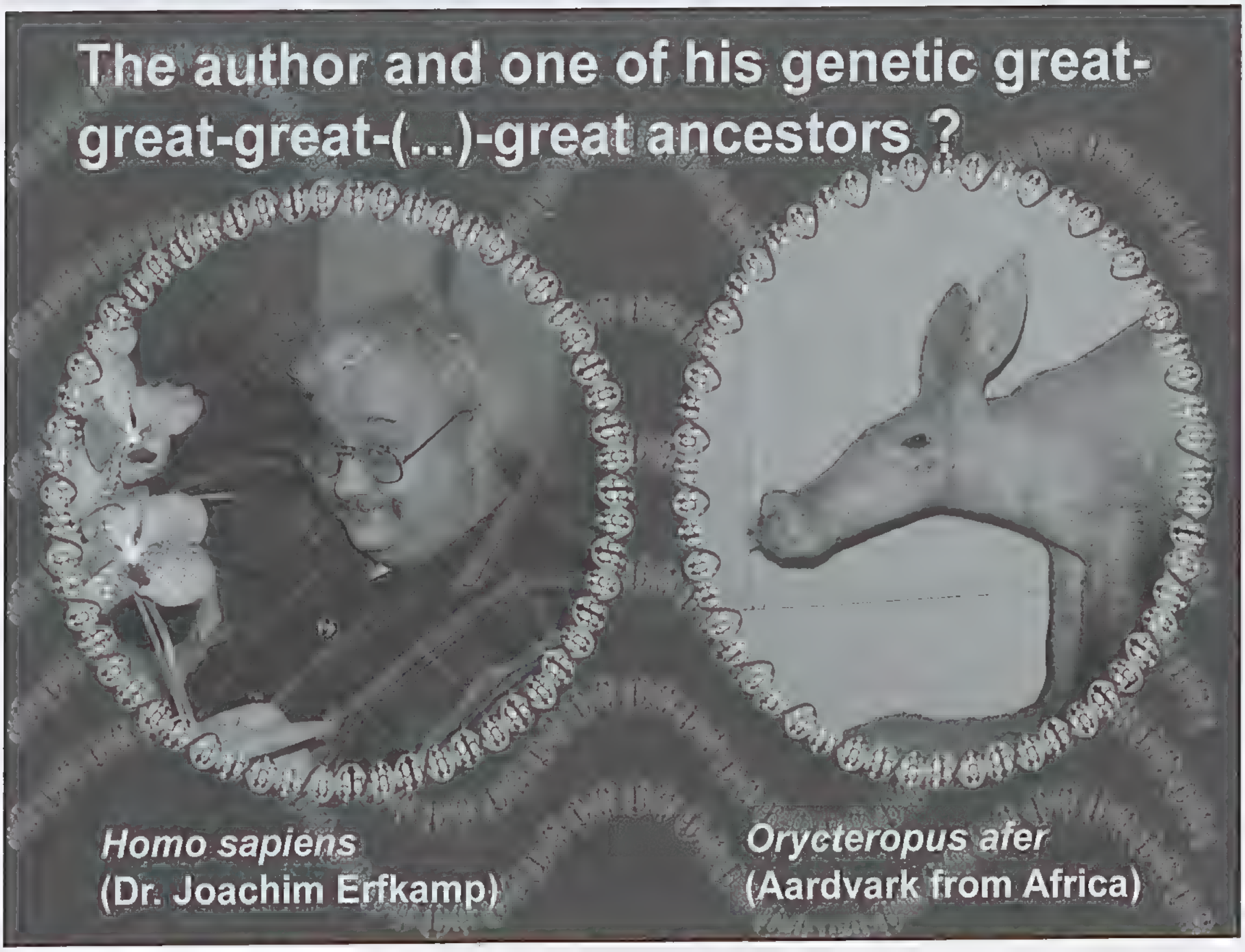
Dendrobium cuthbertsonii

or

?

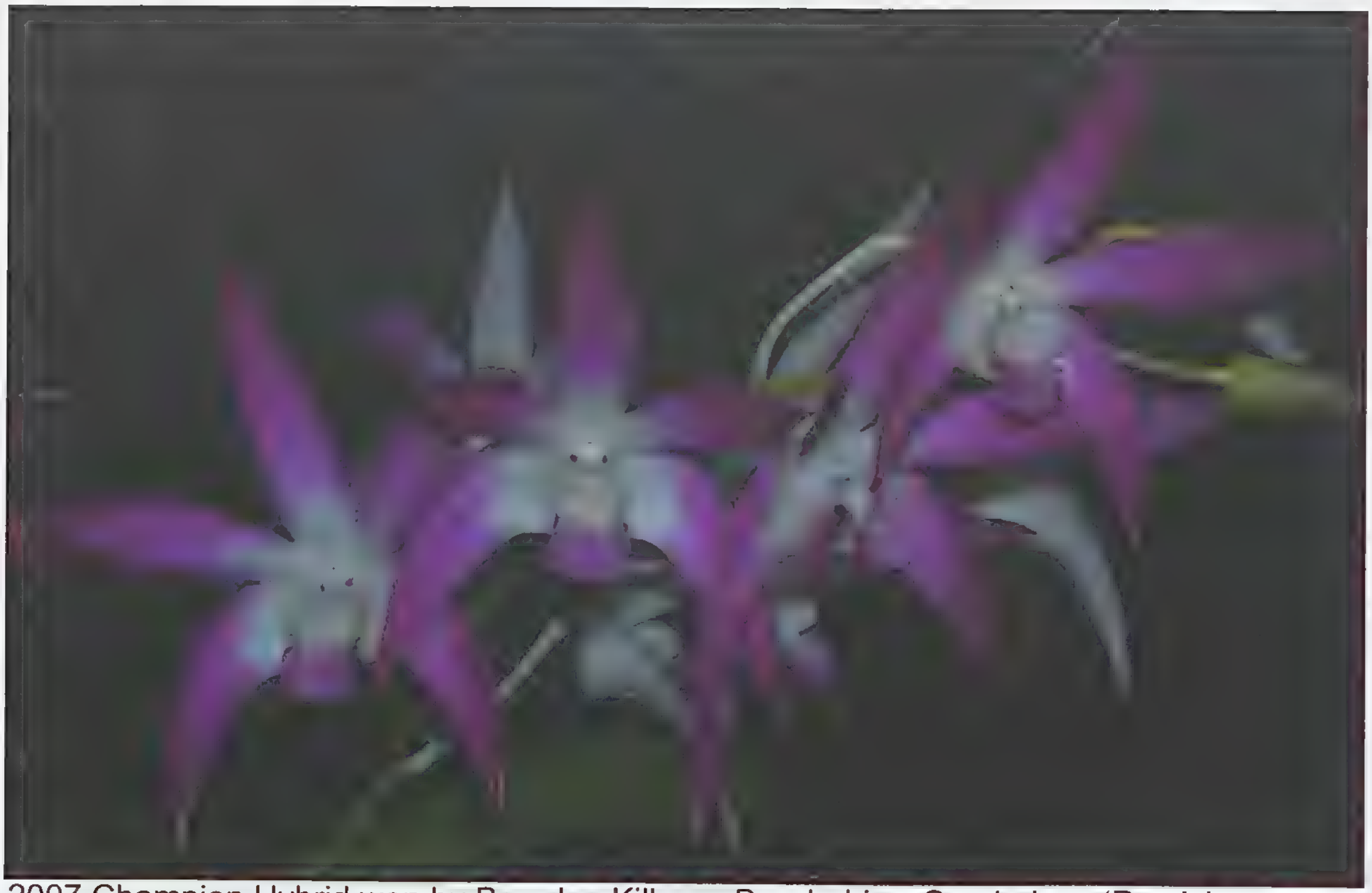
Maccraithea cuthbertsonii

The author and one of his genetic great-great-great-(...)-great ancestors ?



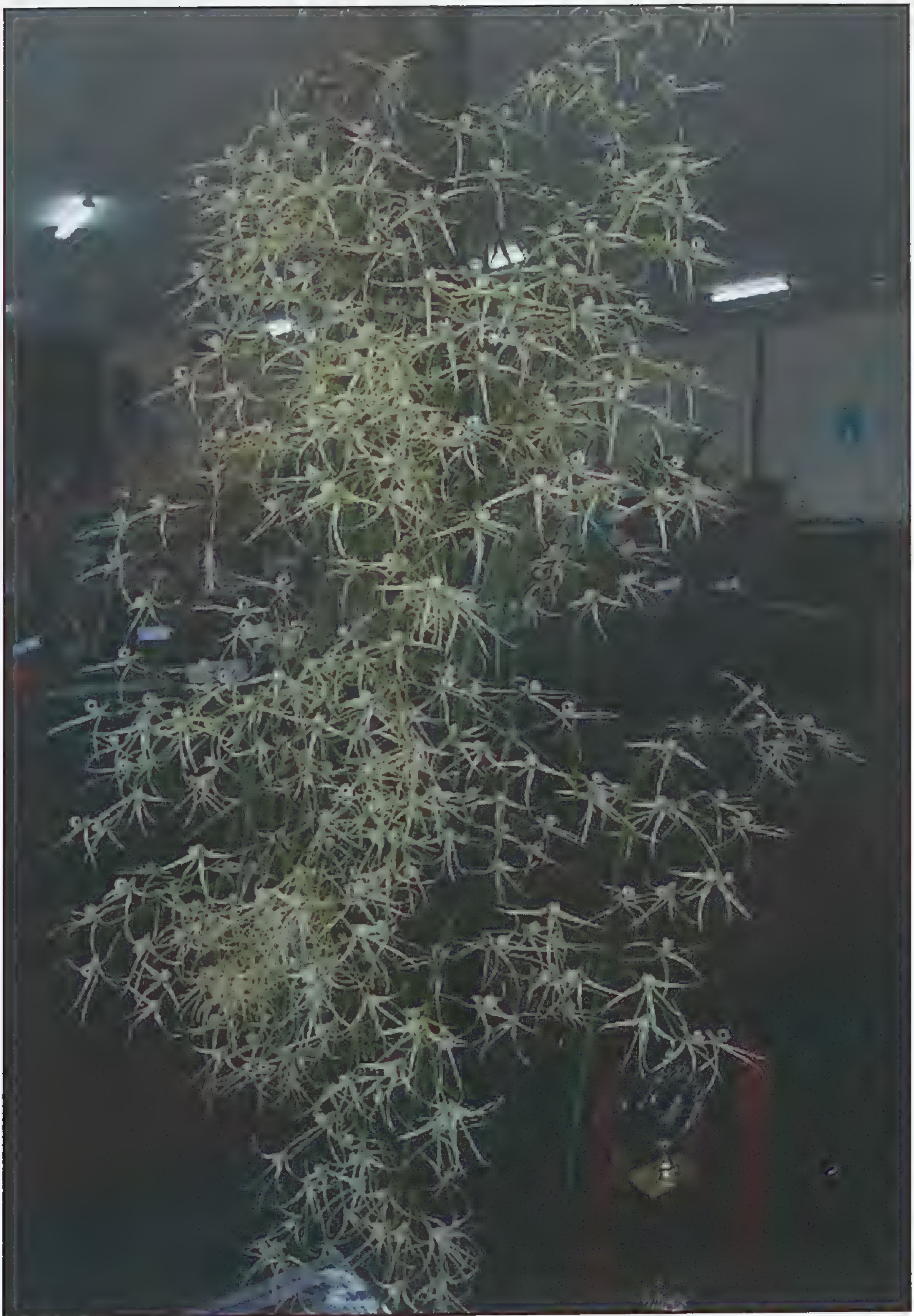
Homo sapiens
(Dr. Joachim Erfkamp)

Orycteropus afer
(Aardvark from Africa)



2007 Champion Hybrid won by Brendan Killen – *Dendrobium* Sarah Jane 'Purvis'. Kabi Group Show.

Presentation of 2007 Champion Species to Roger Finn by President Eddie Boudette (right). Kabi Group Show.



2007 Champion Specimen won by Mick Bartlett, *Dockrillia teretifolia*. Kabi Group Show.

Photos Graham Corbin

Australasian Native Orchid Society (QLD) Kabi Group
Fifth Australasian Native Orchid Show

The ANOS (Qld) Kabi Group held its 5th Annual Spring Show on 25th and 26th August 2007. Prior to the show there were great concerns regarding the quality and quantity of flowering plants that might be available for display. We have had a most difficult growing season with the weather changing continuously from winter to summer and back to winter – the poor orchids don't know what season it is. South-east Queensland is experiencing the most severe drought for 100 years and in addition level 5 water restrictions are in force which restricts watering from the reticulated supply to a few hours a week. Hence the installation of rainwater tanks is a boom industry. All we have to do now is to wait for rain to fill them.

Surprisingly our members were able to bench more plants than anticipated and proved to be of very good quality. The Champion Specimen was a plant of *Dockrillia teretifolia* owned by Mick Bartlett and the Champion Hybrid was *Dendrobium* Sarah Jane 'Purvis' owned by Brendan Killen a member of West Brisbane Orchid Society. It is very encouraging to see an increasing number of plants benched by other orchid society members. The Native Orchid Society of Toowoomba sent down more than twenty plants. Roger Finn's plant of *Dockrillia teretifolia* won the Champion Species. This was a rewarding weekend for Roger. Apart from gaining this Champion and other Class placings he also won a Champion award at another show at Mt Coot-tha.

Again this year the show was fully sponsored prior to commencement. I sincerely thank all the sponsors. Our Bulletin Editor, Graham Corbin produced a CD of over 500 native orchids. Interspersed amongst these slides was an individual acknowledgement of sponsors. This slide show ran continuously all day and received very favourable comments. He also produced a number of CD's, minus the sponsors names, for sale to the public and these were quickly snapped up.

The success of the show must be attributed to the fantastic support of our members. I don't know of any orchid society that is not able to gain access to the venue until after 10 pm on the night before the show. Despite this our members turn up to prepare the hall for benching on Saturday morning. I also congratulate our Judging Panel for their support. No show can succeed without a capable and dedicated Show Organiser. We are very fortunate that Rhonda Harvey possesses both these qualities.

As has been the practice in previous years, the Group dined together on Saturday night at the local tavern with twenty nine members in attendance.

Eddie Boudette
President
ANOS (Qld) Kabi Group Inc.

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Australasian Native Orchid Society Inc.
Geelong Group Annual Show 2007

Another year gone and another successful show over. We continue to have more entries than the year before which just goes to show we must be learning something. It is usually too late for a good display of Dendrobiums, but this year we managed to have a small selection of *D. striolata*, *D linguiforme*, and a couple of hybrid Dendrobiums. Anita Evans won the Champion Dendrobium section with the striolata, beautifully grown in a little wooden basket.

Our *Sarcochilus* display is getting more colourful with more of the latest hybrids starting to come into flower. Our champion *Sarcochilus* of the show was a remake of an oldie, it was a *Sarcochilus* Heidi, evidently made with superior parents, as both the shape and colour were exceptional. It was a small plant, just one spike, and when they said "good things come in small parcels" they were right. The owner of this little plant was Malcolm Pearce. Malcolm's choice of orchids is Cymbidiums, but we are teaching him what a good orchid is and he is growing his *Sarcochilus* very well and his collection of these is expanding.

Our Reserve Champion Sarcochilus was a *Sarcochilus hartmannii*, a crossing with 'Red Snow' and 'B.K.' in it's breeding, the plant is owned by Don Bradshaw. Don always comes up with a beautifully grown *S. hartmannii* each year for our show; they flower just at the right time for us.

This year Des Hill from Warrnambool, made the long trip to Geelong bringing a boot full of orchids along just to show us how they grow Sarcs down that way. He came because the shows of his local club are finished by end of September, and didn't have anywhere to display his *Sarcochilus*. I think he was very happy on the way home as he received quite a few ribbons for his effort, and says he will be back next year.

Our members in Geelong have been doing it hard this last 12 months, as the Barwon Water Board put a very severe stage 4 water restriction in force. This means NO outside watering, so for the last 12 months members have been carting shower water and laundry water by bucket to their orchid house and special garden plants. Just in the last couple of weeks it has been eased slightly and they can now water for an hour twice a week – they think it is heaven.

On the Saturday night during the show weekend, we had a downpour, roads flooded everywhere and down in the Otways where the reservoir is located, the skies opened up and everything was drenched, no one complained about getting wet feet stepping through puddles, it was glorious. The rain lasted most of the day on Sunday, but stopped just in time for us when we were packing up.

I would like to say "Thank you members for another wonderful display" and "Thank you for the time you so cheerfully gave over the weekend".

President Frances Wilde

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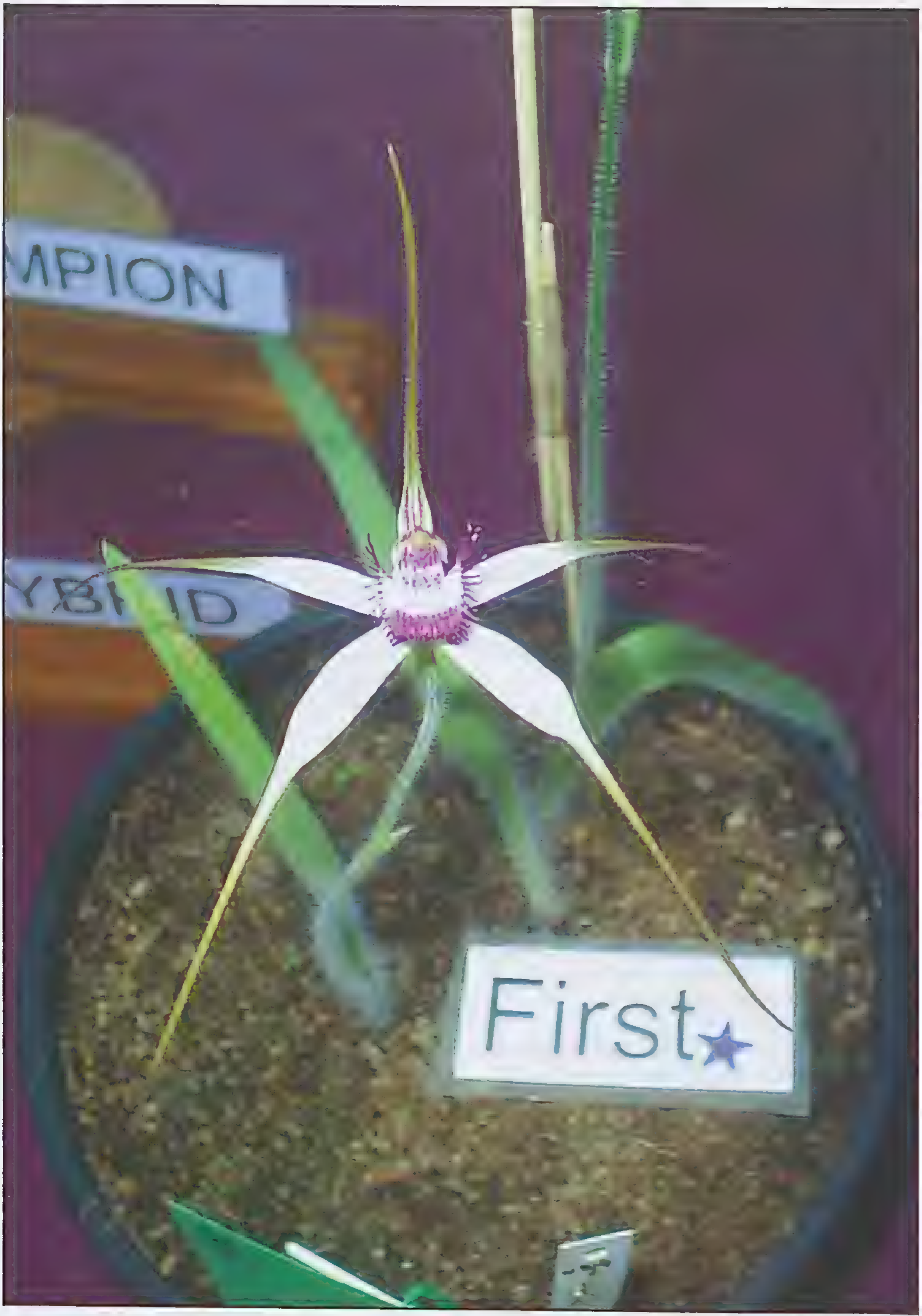
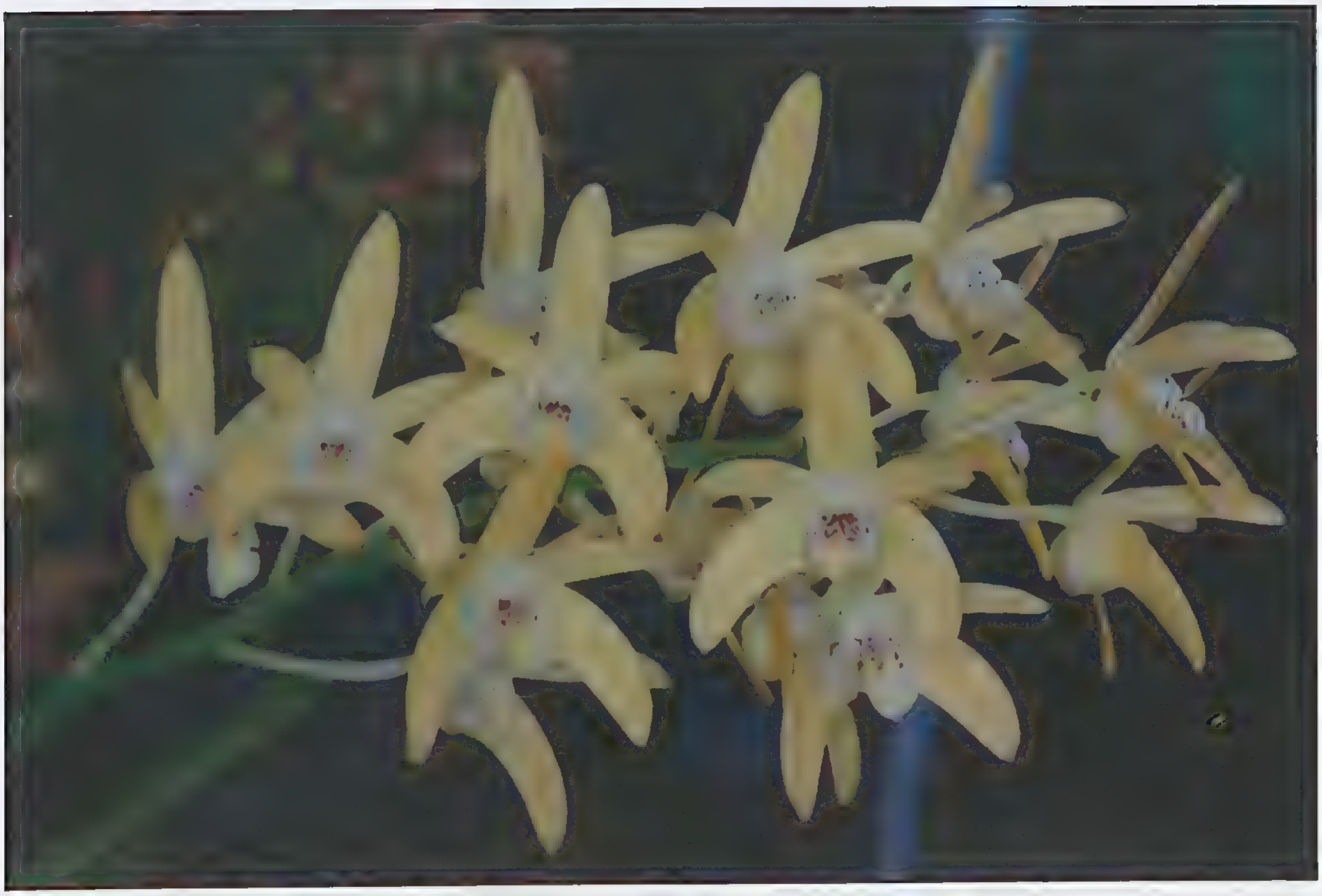


Reserve Champion and Champion Native Species with his plant *Caladenia arenicola*, Beenleigh Show, grower Michael Zink.

Part of the Beenleigh Show with Champions table in foreground.



The Grand Champion and Champion Native Hybrid was *Dendrobium* Kayla x *D. speciosum*, Beenleigh Show, growers David & Kaye Buhse.

The Australasian Native Orchid Society, Beenleigh Inc. Maiden Show at Beenleigh Showground 2007.

A club that was formed this year has presented its first Native Orchid Show. The Australasian Native Orchid Society, Beenleigh Inc. presented their Maiden Show as part of the people's show at the Beenleigh Showground on 14/15th September 2007.

They were allocated space from the Beenleigh Show Society, which they filled and had excess plants that they could not fit in the judged section. Show Secretary, Diane Walker advised that the Schedule released had offered orchid growers 32 sections, in which to compete. There were 116 entries received.

Judges, Trevor Porteous, Ian Cason, John Roberts (Vice President) & Len James.

Major prizes were sponsored by Cedarvale Orchids, Easy Orchids, John Wolff Orchidculture, Wondergrow Products, The Martens Family, Michael Zink and David Cleal.

The Grand Champion and Champion Native Hybrid was *Den*drobium Kayla x *D. speciosum*, which was owned by David & Kaye Buhse of Runaway Bay. The Grand Champion was sponsored by Cedarvale Orchids who sold the plant to the owners, approximately five years ago.

Michael Zink of Toowoomba, who is a member of the new Group, took the Reserve Champion and Champion Native Species with his plant *Caladenia arenicola*.

The Champion Specimen was awarded to John Roberts of Advancetown, for his tray of *Mediocalcar decoratum*.

The Floral Art Section was open to the general public as well as orchid club members. Elizabeth Herbst of Woongoolba took out the Champion with her exhibit. The theme was "Bringing in the Harvest"

David Cleal, who is the President, is extremely pleased with the Judged Show and gives credit to the tireless members who went to great lengths to make the show a success. The Show has been deemed a great success, with offers to make next years a larger event.

David Cleal
President

AUSTRALIAN ORCHID RESEARCH
Volume 5. 2006
New Taxa of Australasian Orchidaceae.
by David L. Jones and Mark A. Clements *et al*
Published by the Australian Orchid Foundation 2006.
ISBN 0-9595384-8-8.
Price: $40.00 plus postage.
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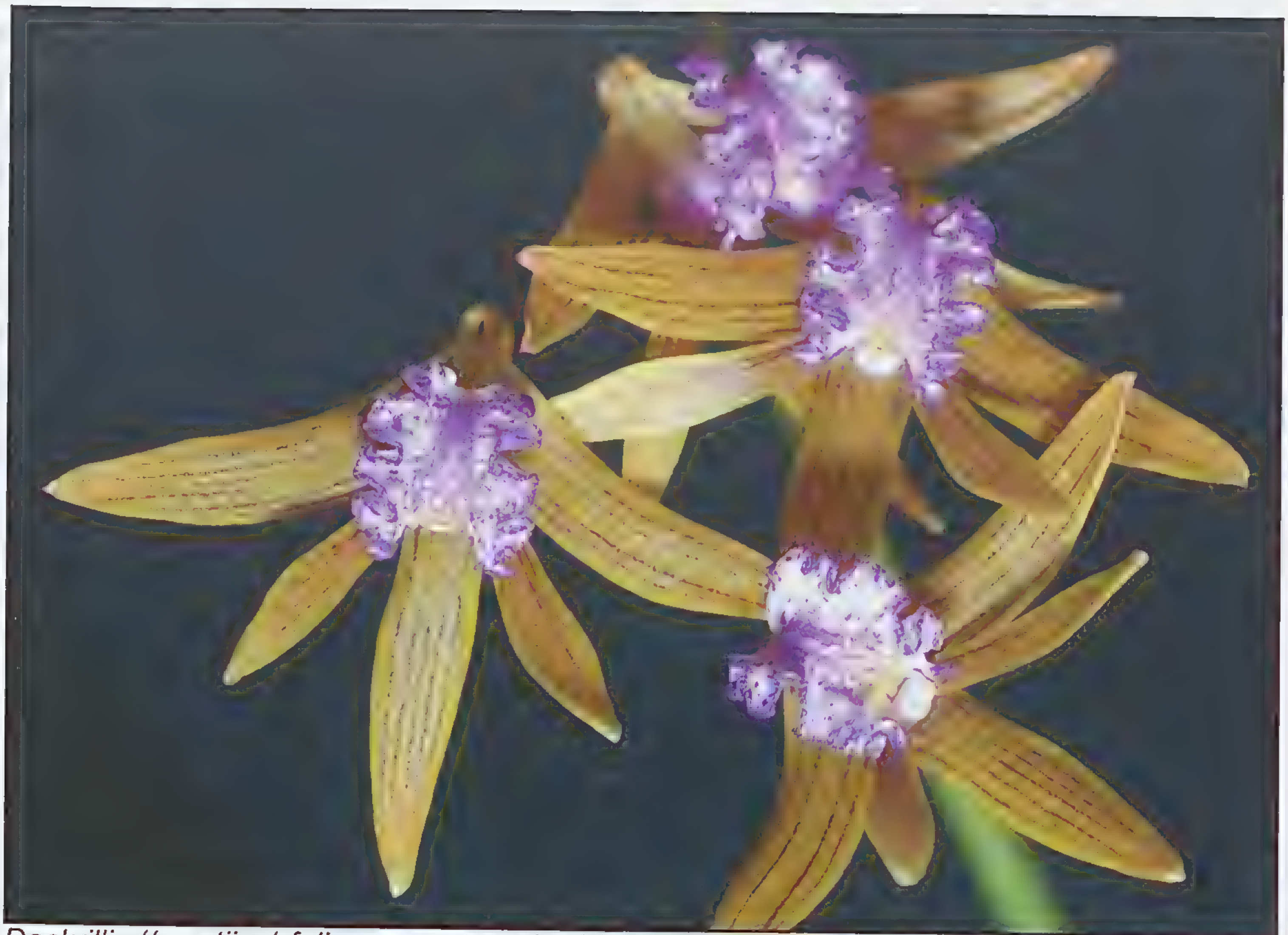
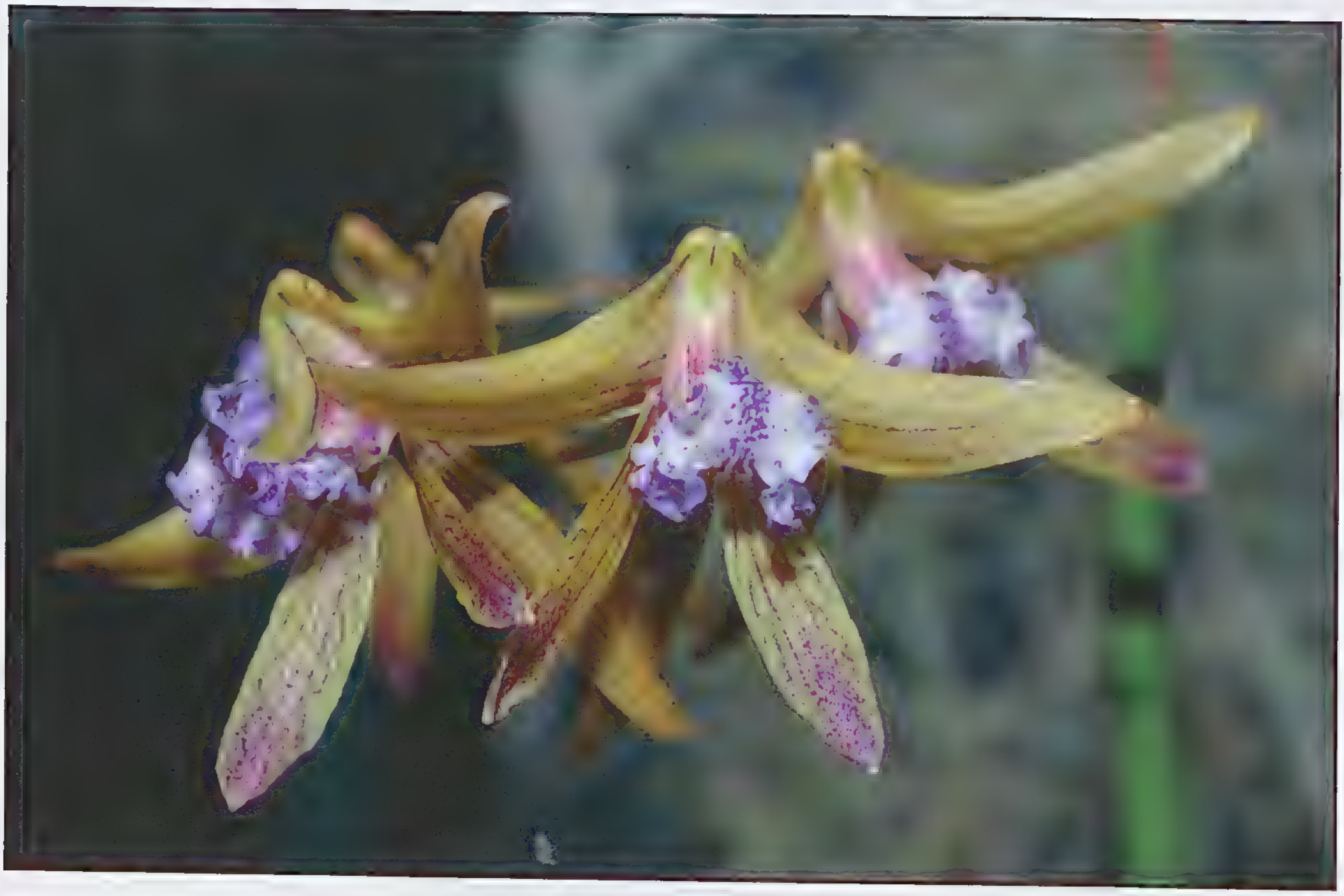
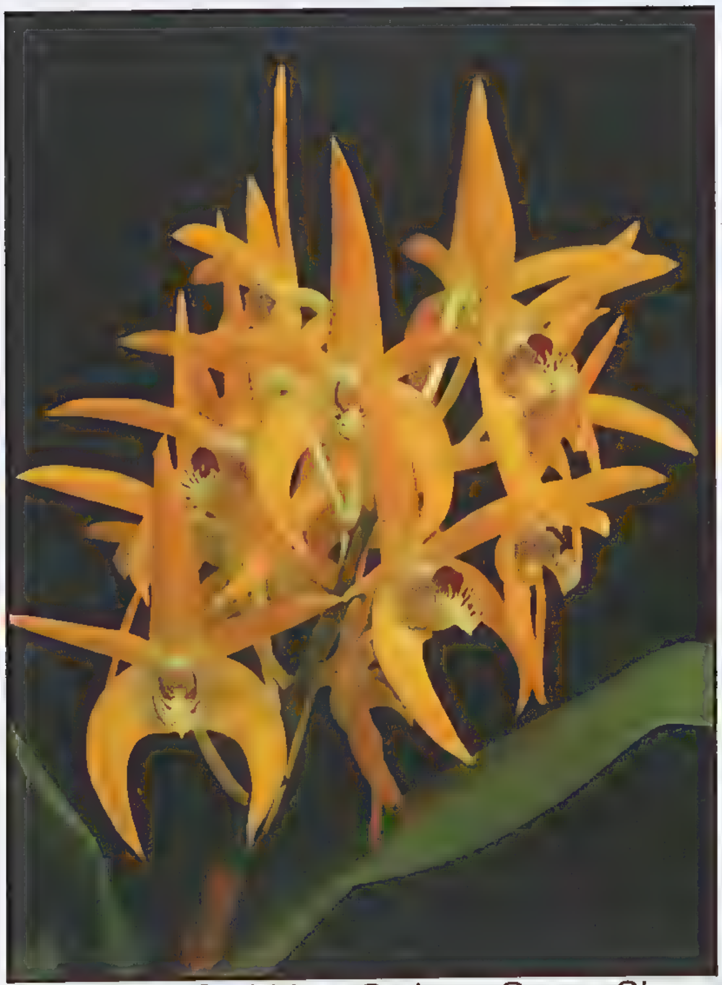


Dockrillia ((*mortii* x (*fulignosa* x *convoluta*)) 'Orange Glow' x *D*. ((*mortii* x (*fulignosa* x *striolata* 'Neville') 'Big Time'. Grower Bill Dobson.

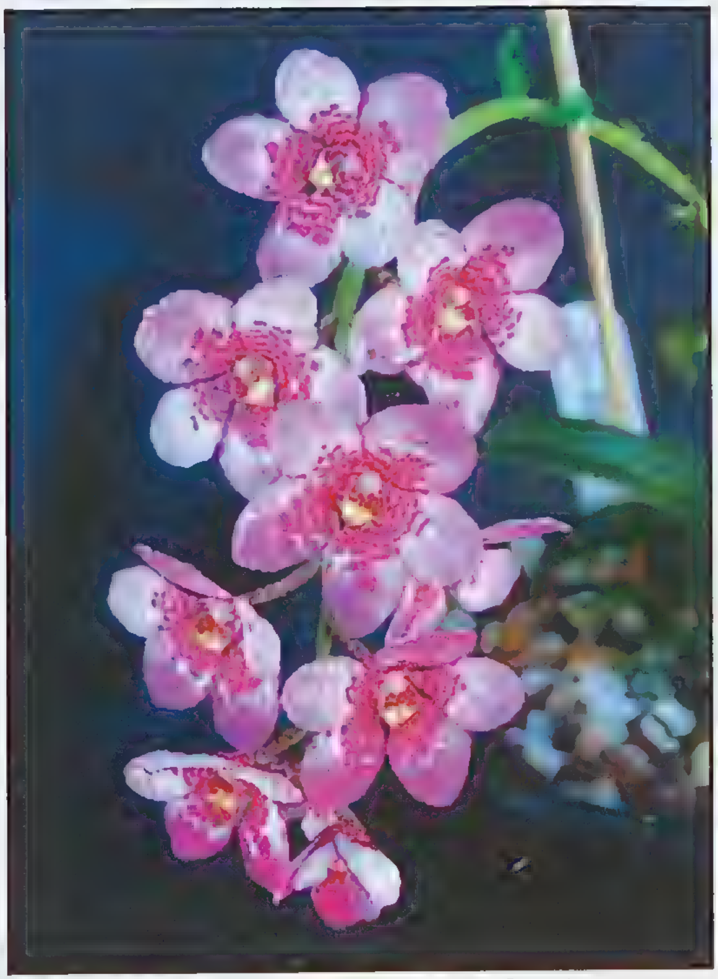


Dockrillia Australin Ginger 'Big Guy' grower Phena and Brian Gerhard. Photos Bill Dobson

ANOS Warringah Group Show 2007. Photos Bill Dobson



Champion Orchid at Sydney Group Show; *Dendrobium* Avril,s Gold x *D.* Yondi Tina 'Goliath'. Grower Henk van den Berg



Sarcochilus Heidi, Champion Geelong Group Show,
Grower and photo Malcom Pearce.

The Australasian Native Orchid Society Warringah Group Spring Show Report.

Despite the strange weather conditions leading up to the September weekend of our show, plants arrived on the Friday afternoon by the trays full. The benches filled quickly and the rush to bench the plants and build the stage displays began in earnest.

6.00 pm saw it all stop as we dinned on pizza and Chris Arnott's home made beer. Then the final rush before the judges started at 8.00 pm.

Congratulations to all the Champions which went:
Grand Champion - Mark Clements - *Linguella* sp. nova. 'Karri'.
Native Epiphyte Species - Mark Brown - *Dendrobium speciosum* 'Madeleine'.
Native Terrestrial - Mark Clements - *Linguella* sp. nova 'Karri'.
Australian Native Hybrid - David Butler - *Dendrobium* Kayla 'Gold'.
Australian Hybrid or Species - DUNO - *Dockrillia* Australian Ginger 'Big Guy'.
Species Specimen - Mick Korzewoski - *Dendrobium speciosum* 'Windermere' x 'Herberton'.
Specimen Hybrid - Ralph Lumby - *Dendrobium X delicatum* 'Jill'.

Nita Wheeler makes the trek from Yass each with more pots of terrestrials that can possibly fit in the car, also managed to bring up a few pots of Mark Clements. She did mention that she would not do this in future as Mark took out the Champion Terrestrial, which Nita has won over the past years.

Despite the on and off again showers of rain over the weekend the show was well patronised by the public. Members worked hard over the weekend and were duly thanked by President Bill Dobson, at the shows end.

Peter Eygelshoven

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Yass - October long weekend 2007.

Nita Wheeler
'Bunduluk'
Lachlan Valley Way
Yass NSW 2582

Saturday at Rye Park.

For some years ANOS members have been visiting the Dalton area in New South Wales to check on the terrestrial orchids growing at the Oolong Nature Sanctuary. This visit has usually been on the long weekend in October and I am sure some of the participants could tell tales of camping and rugby games on the TV at the Gunning Hotel. (if we could get them to do an article)

A few years ago they were invited by Verdi and Annette Barberis, who live at Rye Park some 40 km from Dalton, suggesting that if we had time we might like to check out the Rye Park Cemetery. I had already on another occasion visited the cemetery there so I knew orchids did grow there, so we left Dalton and visited the Rye Park Cemetery meeting Annette, her husband Verdi and two children Catherine and Verdi junior. Since it was latish on the Sunday we didn't spend a lot of time there but Annette suggested that her parents owned a property some small distance away and we might like to go there the following year and camp.

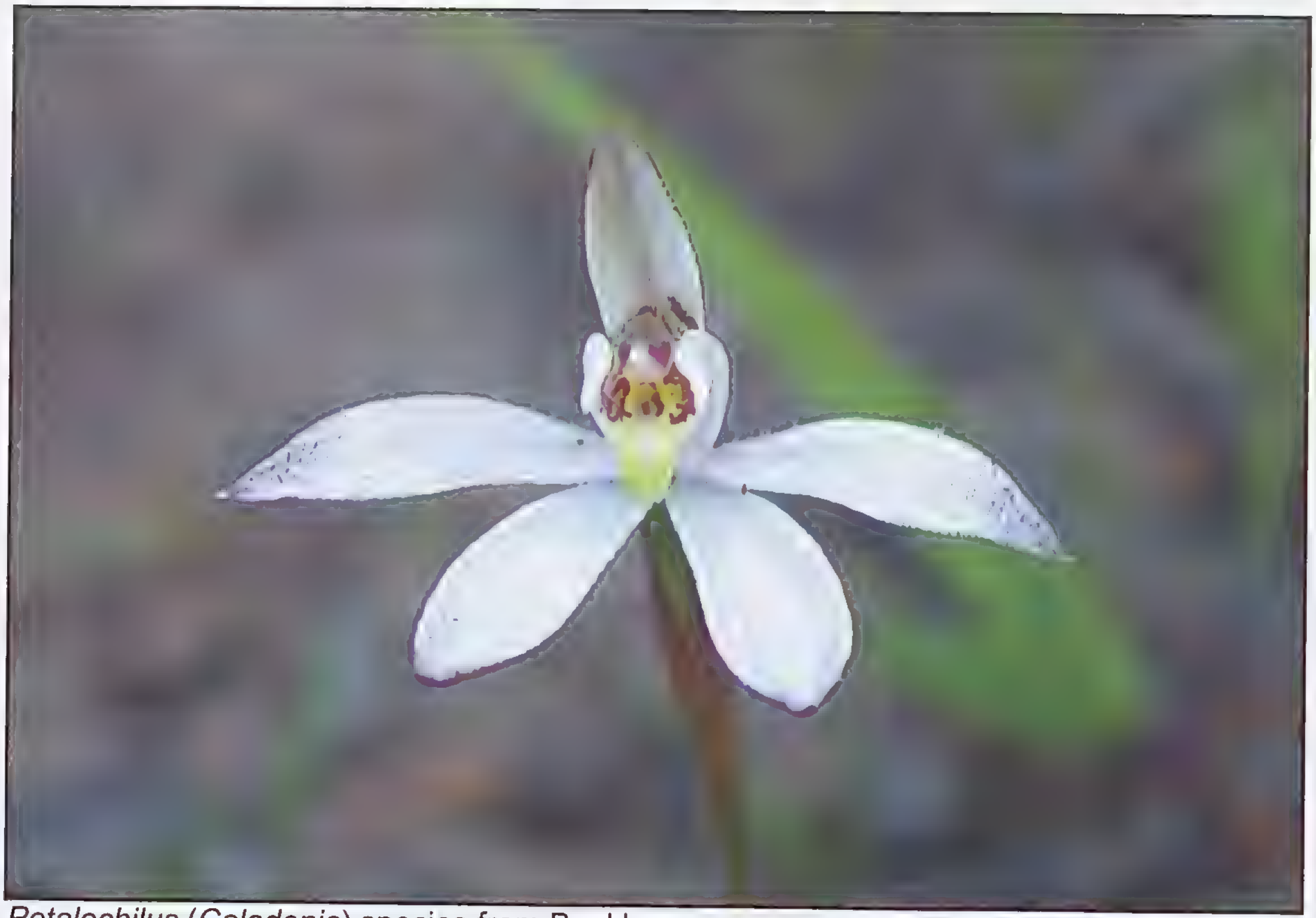
The following year after some good winter rain, Annette rang me and asked me to come out to her parent's property and see the orchids. It was a freezing cold rainy day, but naturally I didn't hesitate, my husband Jim and I were there in 45 minutes. The property is some 600 acres on a dirt back road and was cleared some 70 years ago for grazing. Unfortunately or fortunately for we orchid fanciers, it was totally unsuitable for any form of agriculture and has been allowed to regenerate naturally. It is mostly of Yellow Box Gums, Iron Barks and has small understorey plants which do not pose a real problem to the terrestrial orchids growing there.

The area was basically an orchid wonderland, *Pterostylis nutans* by the thousands, *P. pedunculata*, leaves from *Corybas*, *Chiloglottis*, *Acianthus*, *Calochilus*, *Cyrtostylis* everywhere as well as an interesting sweet smelling *Prasophyllum*. There was a creek flowing through the property with tree ferns growing in places along the edge and evidence of all sorts of wildlife.

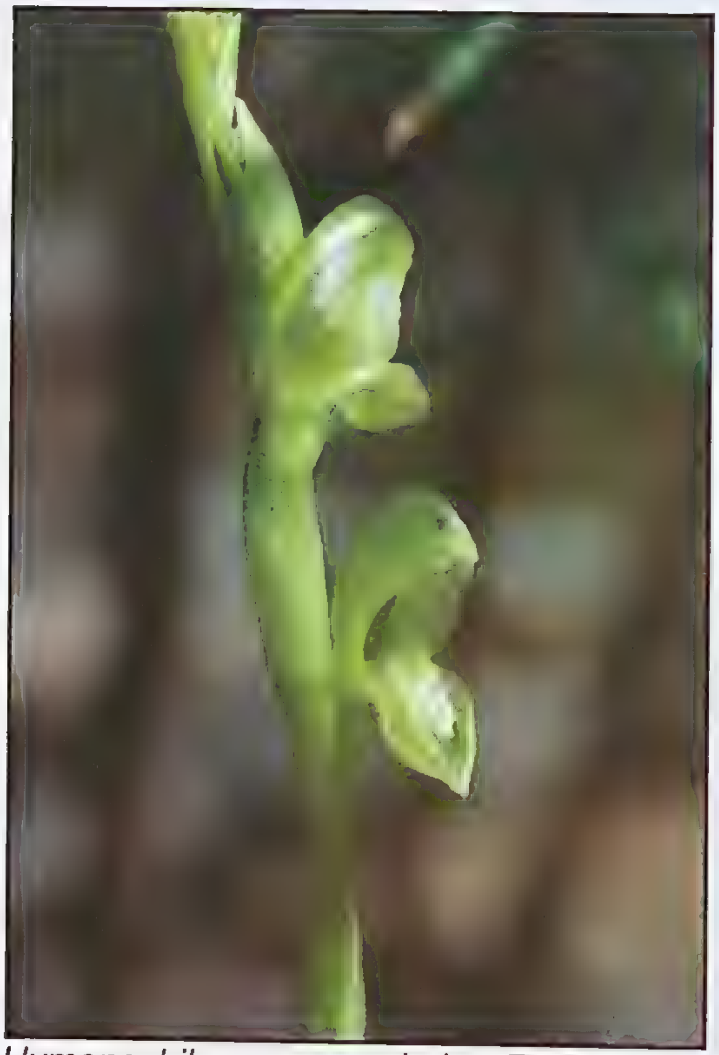
As well as Kangaroos, Wallabies, Blue-tongue and Shingle-back Lizards, Black and Brown Snakes, Wombats, Echidnas, Sugar Gliders, etc there are also unfortunately foxes and feral cats. So it really is the type of area where you need to keep your eyes alert.

So now for several years this area has been on our revisit schedule, sometimes camping and the non hardy types stay with me closer to town. Annette is a wonderful cook on a camp fire, producing baked dinners and exotic desserts, her chocolate sauce is fabulous and I often wonder if Peter travels there purely to enjoy the cooking.

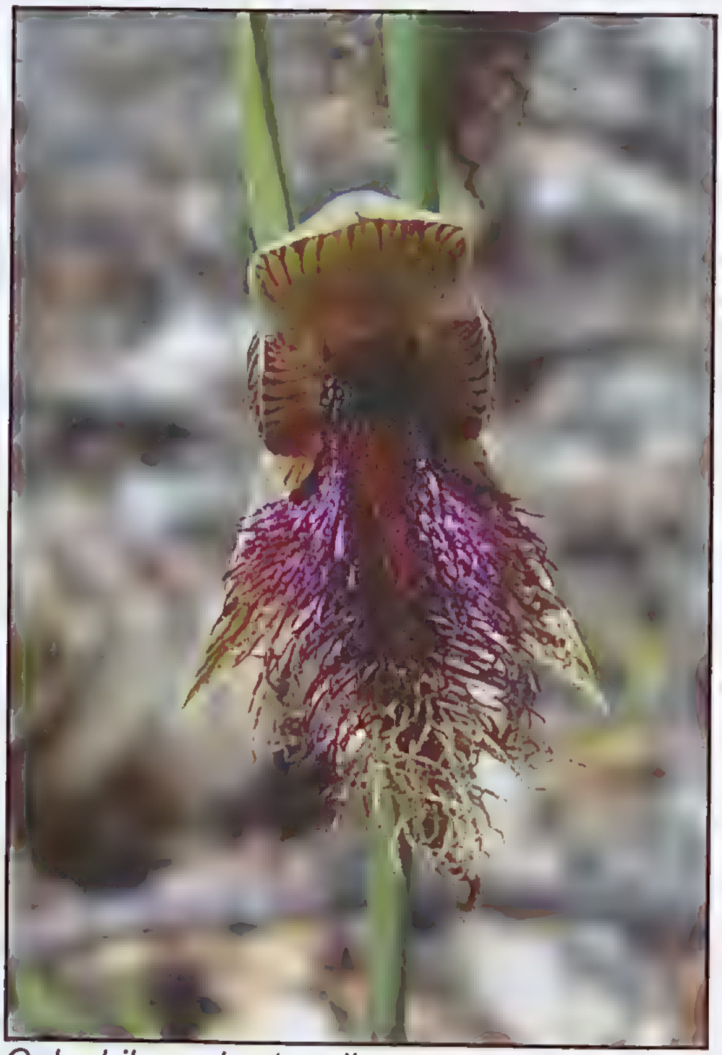
This year 2007, it was only Peter Eygelshoven and Graeme Bradburn who made the trip from Sydney on the Friday afternoon and had already decided that they would stay with Jim and myself.



Petalochilus (*Caladenia*) species from Bookham area.



Hymenochilus cycnocephalus, Rye Park.
(*Pterostylis cycnocephalus*)



Calochilus robertsonii,
Migurra Walking Track.

They arrived late Friday and after insulting my cooking and making rude comparisons with the epicurean delights they were expecting from Annette the following night, I pacified them with copious amounts of wine and sent them off to bed.

On Saturday morning after checking out my orchids, we had breakfast and plotted our day. We firstly drove to a travelling stock route near Boorowa which we had visited last year. This is an interesting area but, a large mob of cattle had gone through the area since our last visit, so I wasn't too hopeful of seeing many orchids, the drought has also played havoc with the vegetation and we have had no rain since late June. On one side of the road we found *Prasophyllum petilum* in flower and many more in bud, *Microtis* species, and lots of dying *Eriochilus* leaves, a few *Pterostylis bicolor* and signs of the *Diuris dendrobioides* which were there in huge numbers last year. A walk along the disused railway line yielded nothing, but on the other side of the road had the *Prasophyllum petilum* as well as lots of *Thelymitra* leaves.

We then moved on to the Rye Park Cemetery and adjacent paddocks, we were all quite surprised to find that in the two years since we last visited the cemetery, a house and sheds had been built on the block next door. Undaunted we started searching and soon found *Microtis*, *Caladenia carnea* and *C. cucullata* type orchids in flower, *Thelymitra* leaves, lots of *Diuris maculata* which had just finished flowering and lots of *Glossodia major* in bloom, some the most glorious dark blue and *Glossodia minor* which had also just finished flowering. Since the day was already advanced we didn't stay long but soon headed for the property, our ultimate destination.

Annette and the family had already set up camp, and since it was AFL grand final day we left Verdi to look after the fire and roasts, while Peter, Graeme, Annette, Verdi junior, Catherine and I headed off into the bush. Verdi had sat down on a rock on an early morning walk that day and discovered a *Pterostylis cycnocephala* beside him. He left his hat there so we could easily find it again. It amazes me that Peter, Graeme and Verdi all had GPS systems but the easiest find we had all day was the *P. cycnocephala* next to Verdi's hat. After a few hours of tramping through the bush, fortunately not coming across anything that slithered we had located the following orchid species;

Pterostylis cycnocephala
Caladenia fuscata
Caladenia gracilis
Caladenia carnea
Caladenia caerulea
Caladenia catenata
Pterostylis obtusa leaves
Glossodia major
Diuris maculate
Diuris sulphurea
Thelymitra species, in bud
Chiloglottis trapeziformis
Pterostylis nutans
Pterostylis pedunculate
Microtis species
Corybas incurvus, finished flowering
Calochilus robertsonii, in bud

Considering how terribly dry everything was, we consider that once again in future years the orchids will rapidly recover, the native wildlife is of course responsible for a lot of flower spikes disappearing but hopefully enough will set seed to keep the populations alive.

We arrived back at camp to a disappointed AFL follower who fortunately had given up on the football and started the cooking. Annette's parents who live on the property always come down for dinner and once again Annette produced, like a magician, roast pork, roast lamb and vegetables and cheese cake with chocolate sauce, all over an open fire. A few hours, a few drinks and lots of conversation later, the three of us headed back to Yass, well satisfied with the day's finds and anticipating the great Spider Caladenia hunt the next day. I think a hot shower and bed felt pretty good to the three of us that night and Jim had even lit the fire to make the boys feel like they were in the country.

Sunday the great spider hunt.

Once again Peter and I were up early so we headed out and down a dirt road to a Travelling Stock Route that I had noticed a few months back. Although the area was privately leased I knew the lessee and had obtained permission to enter, always advisable in the country. The block like everything else was very dry and all we found were a few dozen *Diuris chryseopsis* in flower and some *Microtis* leaves. However the presence of sundews and Burchardia was a good sign for another visit in a better year. On the way home we came across a pair of kangaroos along the roadside. Since hitting a roo in 2006 and not wanting to repeat the experience, I drove slowly along with them until they stopped and then we resumed our speed, they are a real hazard during the dry weather.

By the time we got home, Graeme was out of bed so we planned our day of hunting for Spider Caladenia. Graeme was sure we would find some at our ultimate destination, the Ulandra Nature Reserve, so once my friend Leander arrived, the four of us set off for the great adventure.

Our first stop was Bookham, a small town about 40 km away on the Hume Highway. This is one of my favourite spots and I try to get out there several times during the year. The country is quite rough and scrubby and the drought has hit hard, but we did find a good selection of leaves both living and dead and some flowing plants. There are a lot of kangaroos in this area as the eaten off flower spikes proved, and I was disappointed that the cauline type *Pterostylis* and the *Cyrtostylis* that had looked so promising a month previously, were now dying off before flowering.

We found;

Pterostylis, cauline type dying off,
Diuris leaves,
Genoplesium, finished flowering,
Glossodia major, in flower,
Eriochilus leaves unknown,
Cyrtostylis, probably *reniformis*
Caladenia leaves and an unnamed species in flower,
Thelymitra in bud
Microtis, leaves
Diuris chryseopsis, in flower
Diuris behrii, in flower

All in all a great spot for orchid hunting and if only we could get some rain, it will be a delight once again.

Jugiong was our next stop, mainly because we hadn't been there before but the whole area including the cemetery was over grown with long green grass, so obviously there had been better rainfall there than most areas. We couldn't see any likely looking places so we moved on down the highway. We won't be putting Jugiong on our list of places to revisit though it is a great little town.

We set off across country towards Cootamundra but Graeme's sharp eyes saw a sign at Muttama so we found the Muttama Cemetery. It is set way back from the road and you have to go through private property to get there but I had been told by a native plant enthusiast that there were orchids there. Graeme noticed some White Cypress growing at the back of the cemetery so we all became very optimistic, but unfortunately despite the presence of the native species indicative of orchids, we didn't even find a *Microtis*. We decided because of the location and vegetation this would be an ideal place for a revisit. Still no Spider Caladenia.

After passing through Cootamundra on the road to Junee, we stopped at the Migurra Walking Track which I had been too on my way home from Mildura earlier in winter. This is another definite revisit but at present it is very dry, we found *Microtis*, *Thelymitra* leaves, *Diuris maculata* almost finished, *Caladenia fuscata* in flower and *Glossodia major* also in flower. The highlight for Leander and I was finding six *Calochilus robertsonii* in flower, particularly since Graeme had walked passed without noticing them. We were both excited but Graeme and Peter of course said they saw those all the time along the coast so it wasn't all that exciting to them. Still no Spider Caladenia.

We continued to Bethungra, and after failing to find the cemetery we headed out to the local dam to try our luck. This area unfortunately was all cleared and grassed, not at all what we were looking for. Since Graeme had spotted cypress on the way into the dam, we drove back and pulled over at a likely looking spot. Everything was very dry and we were not hopeful, but Peter had no sooner stepped up the embankment when he made our first find, a large in bud and very healthy *Thelymitra*, and within a few yards a very healthy Spider Caladenia, in bud. This encouraged us and we set off madly searching intently but unfortunately it was the only spider we did find. However we did see the following and this is a definite on our revisit list.

Diuris maculata,
Microtis leaves,
Thelymitra, leaves and buds,
Spider *Caladenia*, in bud,
Caladenia carnea,
Glossodia major, in flower,
Cyrtostylis reniformis, finished,
Pterostylis mutica,
Pterostylis, cauline type leaves,

Graeme was very keen to visit the Ulandra Nature Reserve, he was sure the spiders would be there. Unfortunately after finding the place, we also found several big towers had been erected on the hill and there were several big padlocks on the gate, so this place is now closed to the public.

There had been some discussion about visiting the liquorice factory at Junee, Peter had seen it featured on TV and since Peter cannot function (and probably becomes dangerous) without regular nourishment, a visit to the factory was in order to compensate for the closure of the nature reserve, unfortunately the factory was a tourist attraction and not at all what Peter was expecting. We headed back to Yass through Eurongilly and Nangus, a quick stop at Nangus yielding nothing. So after a day of 380 km, we were glad to get home, and after a big meal of Chinese food and many, many drinks, our disappointment at lack of Spider Caladenia mellowed. There is always next year!

The long way home.

On Monday Graeme and Peter decided to go home the long way, rather than taking the highway, both to see some old favourite spots and to see if they could find some new areas. They left after a hearty breakfast and did come across several new areas worth a good look when the seasons offer better conditions for orchid hunting. At their favourite spots they only saw some more of the orchids that were found over the weekend, and still no Spiders.

-oOo-

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- **ANOS Gold Coast**, C/o 8 Clam St. Runaway Bay 4221. Meetings 1.30pm on the last Sunday of the month. Southport Community Centre, Lawson St, Southport.
- **ANOS Kabi**, PO Box 424, Aspley 4034. ☎ (07) 3359-5752 Meetings 7.30pm, 2nd Tue. each month (except Jan.). Bald Hills Memorial Hall, 2126 Gympie Rd., Bald Hills.
- **ANOS Mackay & Dist.**, PO Box 138, Koumala, 4738. ☎(07) 4950-1065. Meetings 7.30pm, 2nd Thursday of each month at the Andergrove Community Centre, Celeber Drive, Andergrove.
- **ANOS Townsville**, 92 Curie St, Wulguru, 4811. ☎(07) 4778-4311. Meetings 8pm, 1st Tue. each month. Townsville Orchid Society Hall, Pioneer Park (opp. Willows Shopping Centre), Thuringowa..
- **Native Orchid Society of Toowoomba**, P.O. Box 2141,Toowoomba 4350. Meetings 7.30pm, 1st Fri. each month. Luthern Church Hall, Cnr. West and Alderly Sts, Toowoomba.

VICTORIA

- **ANOS Geelong**, Unit2, 2 Elizabeth St., Belmont 3216. ☎(03) 5243-4286. Meetings 8pm, 2nd Wed. each month. Uniting Church Hall, Moorabool St., South Geelong.
- **ANOS Victoria**, P.O. Box 354, Glen Waverley 3150. ☎(03) 9874-5343. Meetings 8pm, 1st Fri. each month. Demonstration Hall, Burnley Horticultural College, Swan St., Burnley.
- **ANOS Melbourne Suburbs Group**, PO Box 239 Mt Evelyn Vic. 3796. ☎(03) 59622758. Meetings held on the 4th Wednesday of the month at 7.30pm at Montrose Primary School, Leith Rd., Montrose 3765 (Melways 52 D7)

SOUTH AUSTRALIA

- **Native Orchid Society of South Australia**, P.O. Box 565, Unley 5061. ☎(08) 8356-7356. Meetings 8pm, 4th Tue. each month. St. Matthews Hall, 67 Bridge St., Kensington.

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- **ANOS New Zealand**, Margaret Phair, 21 Paparoa Rd, Howick, Auckland, New Zealand.
- **New Zealand Native Orchid Group**, 22 Orchard St., Wadestown, Wellington, New Zealand.

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Peter Eygelshoven
Editor, The Orchadian.

Vincentia, disappointment, frustration, relief and more frustration.

Alan W Stephenson
National Conservation Officer,
Australasian Native Orchid Society (ANOS)

The saga began in 1997 with well-known Sydney orchid identity, Ruth Rudkin who was entertaining two Austrian orchid aficionados, Karl Robutsch and his daughter, Monika Ottowitz. Ruth had contacted me to ask if I could help her by showing her guests some orchids on the New South Wales south coast. Naturally I agreed and we had two excellent days in the district and I was able to show them many of our local species. However there was one species of *Prasophyllum,*at the township of Vincentia, I could not identify that day. It was on a vacant section of heath land accompanied by numerous other terrestrial species. I thought nothing more of it until the slides I took on that day were processed. These looked like *Prasophyllum affine* which I had photographed two years prior. At the time I was told the site was believed to be the only site in existence, but my lack of knowledge led me to believe I had seen yet another *Prasophyllum* which I was unable to identify. This came about due to many colour differences between plants from each location and it was not until I consulted more experienced orchid authorities that these differences were made clearer to me.

Graeme Bradburn and the late Ron Tunstall asked where I had seen these plants and were pleasantly surprised when informed of the location. Nothing eventuated until 2000 at the time of the ANOS Conference in Melbourne, when I received a call from the Shoalhaven City Council Threatened Species Officer who wanted to know the precise location of the plants, exactly when I found them and how sure was I of the correct identity. I replied that he should not take my word for the identification and should contact the Centre for Plant Biodiversity Research (CPBR) to be certain. This was done immediately and then the trouble began as I learned the orchid site was to become a Leisure Centre, Regional Shopping Centre and the site for 900 homes but the discovery of *P. affine* had thrown this into disarray.

At this time I was given a copy of an Environmental Assessment undertaken by a consultant, which indicated the presence of several orchid species *in situ* including an unnamed *Prasophyllum* sp. As I knew of more orchid species on the site than were listed, I wrote a letter to the General Manager of the Shoalhaven City Council (SCC) and the then head of the Threatened Species Unit of the National Parks and Wildlife Service for the New South Wales Southern Region (now DECC, Department of Environment and Climate Change), outlining my species list. The quick response was a demand in the form of a Freedom of Information (FOI) request to tell all I knew of the site and my business. My response was that as I was a private citizen without a business, no further information could or would be provided, as I was exempt from an FOI. Naturally the unnamed *Prasophyllum* sp. was *P. affine* but the consultant made no effort to be more exact in his identification, a fact which made my blood boil.

As the issue of *P. affine* was now in the public domain, a Recovery Team was formed of which I was a member with John Briggs of the DECC as Chairperson. The team consisted of persons who had a direct interest in *P. affine,* either through owning land on which it was known to occur or in some way being involved through the SCC or DECC. Formed in February 2001 the first decision made was to burn and/or slash several areas where *P. affine* occurred and learn the impact of either technique. Both methods neither increased nor decreased any known populations, however it did uncover a population of 50 plants in a sedge area, originally thought too dense for the species. Several Control Plots were then established for monitoring of plant numbers. I have been involved in this operation with John Briggs who will eventually produce a paper on the incidence of flowering. The second decision made was to determine the pollinating vector for *P. affine* as this was so far unknown. To achieve this, an Entomologist, Dr. Colin Bower, was employed for the 2001 season. Dr. Bower spent three weeks in the field and produced the first authoritative information regarding *P. affine* pollinators. Since then he has been responsible for further work on the pollinators, their preferred habitat and lifestyle and this information is now considered the definitive work on *P. affine* and has achieved an understanding of this species which might never have been possible if the Vincentia population had not been discovered.

In the beginning, the previous owners of the 127 hectares had engaged a company to construct the Regional Shopping Centre and Residential Sub-Division but this company became concerned after learning about *P. affine*. It appears they had paid $300,000 for the right to construct but with a "Sunset Clause" in the contract requiring a date of commencement, the concern was about losing that money due to delays associated with *P. affine.* As it turned out no money was lost as *P. affine* was not a factor until well after the contract was signed. However, the company withdrew from the contract due to probable extended delays. Unfortunately this did not deter the SCC as the construction of the Leisure Centre progressed without delay and as such nine individuals of *P. affine* were destroyed in the process. This was without any penalty; despite *P. affine* being both a State and Commonwealth listed Threatened Species. Isn't it amazing what some people can destroy without concern or interference? All was quiet for a short period until Stockland Developments purchased the land for $24.3M.

During the course of numerous meetings of the *P. affine* Recovery Team several plans were presented by the original land owners and later Stockland but none of these plans were able to satisfy the team regarding proper protection of *P. affine* or the habitat of the pollinators and at this point I should note the occurrence of another Vulnerable Species *in situ*, *Cryptostylis hunteriana*. Now that a large developer was involved, an in-depth Environmental Impact Statement (EIS) was produced. This EIS produced a total of 33 Threatened Species of *flora* and *fauna* on the site, however when push came to shove when a decision regarding development was required, this number was melted down to 15. On all the plans presented was a series of what Stockland termed "Adaptive Housing". These were two storey units and were said to be for invalid or impaired people and a carer but the DECC was strongly against this part of the plan as it was within 25 metres of a population of *P. affine*.

In the four years since Stockland purchased this land, they were unable to put forward any plan which could guarantee protection for either *P. affine* or *C. hunteriana*. Frustrated with delays, Stockland went to the NSW Government Planning Minister and arranged for the development to be declared "State Significant" under Part 3A of the NSW Planning Act. This meant the SCC played no part in the operation and all decisions would be made by the Minister for Planning, leaving the DECC in the position of being able only to offer advice, which Planning NSW was not legally bound to consider and as such the development gained NSW approval. However, as Commonwealth Threatened Species were involved the Department of Environment and Water Resources (DEWR) was the final consent authority and I am pleased to say they sent representatives to the area to consult with a selection of local people who through their written submissions had expressed concerns at various aspects of the development. It is now apparent some of those concerns were heeded.

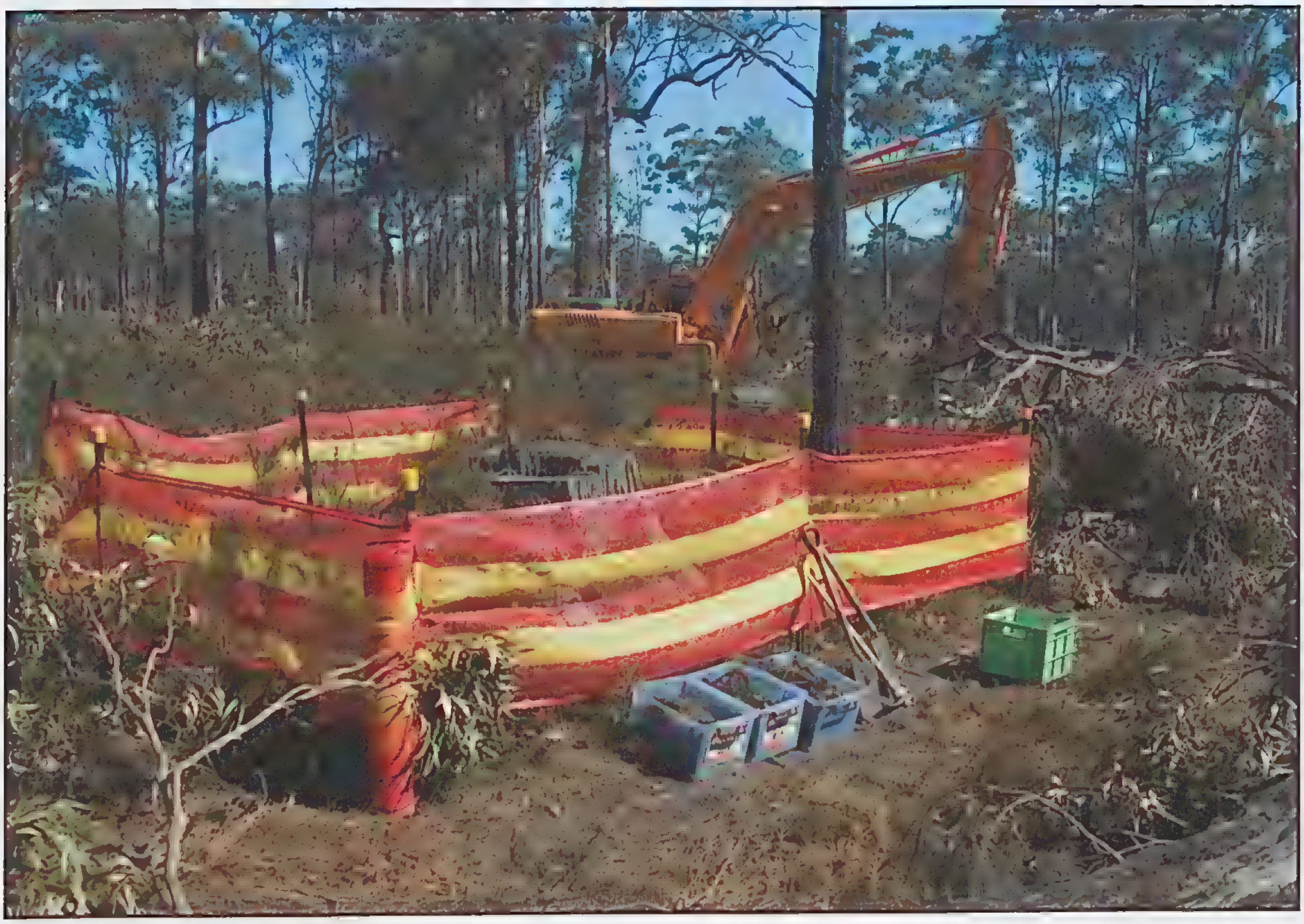
In a last desperate measure to gain development approval, Stockland indicated their desire to "Gift" the 48 hectares of orchid and pollinator habitat to the DECC and I saw this as confirmation they were unable to formulate any plan which could protect either, and I saw this as an admission of failure on their part, as I had previously stated they would never be able to develop that section without impacting upon both orchid species and pollinators. On 31-7-2007 I was contacted by my local Newspaper for a story, they had just learned the development had gained Commonwealth approval. At the same time I was also contacted by the Project Manager who asked for a meeting. At this meeting he showed me the new plans for the development and I was very pleased to note that one condition of development was that the "Adaptive Housing" was to be removed from the plans. I was surprised and delighted as I had not expected the Commonwealth to invoke the *Environmental Protection Biodiversity Conservation Act* (EPBC) even though *P. affine* was listed as Endangered in Schedule 1 of the act. The removal of this housing section came at an alleged cost of $115 m, according to Stockland and is only the fifth time the EPBC Act has been used in this way since its inception in 1999. It appears some note was taken of the public submissions (including four from me over a period of five years), personal conversations, emails and phone calls.

The survey of this area produced 19 identified terrestrial species, all of which one would normally expect to find on such a site, *Prasophyllum sylvestre* with a question mark and another unidentified *Prasophyllum* sp. I believe both would have been *P. affine* as *P. sylvestre* does not occur on this site. I also doubt the identification of *P. sylvestre* and feel it also would have been *P. affine*. The sore point is, why these species were not photographed or flower samples taken in order for a correct identification to be done. I ask this question, as despite the target species being *Arachnorchis tessellata* and *Cryptostylis hunteriana*, the Director General of National Parks asked for searches to be undertaken for *P. affine* although it was not a mandatory requirement. The species missed during the survey were *Cryptostylis hunteriana*, *P. affine*, *Cymbidium suave*, *Orthoceras strictum*, *Diuris aurea* and the newly named *Calochilus pulchellus*.

I find it interesting that all the rare species were not located.

In the years all of this was happening I was employed by the DECC to survey a nearby area which had been identified as suitable habitat for *P. affine*, to satisfy a request from the NSW Scientific Committee. During this survey I encountered two further individuals of *P. affine* and four plants of the then *Calochilus* sp. aff. *grandiflorus*. This species was then considered to occur between Tin Can Bay and Gosford. I had seen a single plant of the same species in 1997 at another site and despite searching yet another location identified by the late Ron Tunstall no plants were ever found. At the time no more was thought of this except to record it in my report. A year later during another survey in the Booderee National Park, I located another individual plant. This plant was collected a few days later by David L Jones who needed fresh material for comparative analysis. After collecting this individual Dr. Mark Clements also of the CPBR had at the same time located a group of 18 plants at another site and the identification process began. The results were published in the *Australian Orchid Research* Vol 5 October 2006, a scientific publication of the Australian Orchid Foundation with the species being formally described as *Calochilus pulchellus*.

Vincentia habitat to be lost to the development.



Extracted orchids in containers ex stump Vincentia site.

Photos Alan Stephenson

In 2006 during another random wander through this yet undeveloped site, I came across another individual of *C. pulchellus* situated in a sawn-off tree stump, approximately 200 metres from the original group but a more extensive search failed to produce more plants. As soon as formal recognition of *C. pulchellus* was published in March 2007, I immediately took steps to have it listed as a Vulnerable Species under the NSW *Threatened Species Conservation Act* 1995 (TSC). I was later informed the nomination had been accepted and was under assessment by the NSW Scientific Committee, with a final determination expected late in 2007. However, this would be too late to protect all plants on the site and I expressed my concerns during a meeting with the Project Manager. He then contacted the Civil Engineer in charge, whom I met on-site the next day. During this visit I noted the individual in the tree stump had produced a new leaf and the capsules from the 2006 pollinated flowers had produced seedlings in the ground around the stump. This was more trouble, a growing population but doomed due to a lack of recognition. Although it appears time has defeated this species I arranged with the Project Manager and Site Engineer to work around the two populations for three weeks so a rescue could be effected. I do not believe in translocation of rare and threatened orchids but as *C. pulchellus* was only located after development consent was granted, I felt compelled to do something. I then contacted John Briggs of the DECC after trying numerous other means to protect *C. pulchellus* (without success) and arrange for him to oversee the translocation. I also contacted Dr. Mark Clements to have him on site as an ultimate scientific authority. It is possible a suitable site might be found for the plants within the Environmental Protection Zone, although their chances of survival are probably 50% at best. If a suitable site was immediately available it is most likely the species would already enjoy a wider rate of distribution with greater numbers than are currently known. On the nomination form to the NSW Scientific Committee listed 25 known individuals across the four sites; however the latest count now stands at 33.

The worst aspect of all of the above is the discovery of threatened and new orchid species on this site was left to amateurs and not the professional consultants employed to do this work. When the first group of *C. pulchellus* was noted on the site I informed the person leading the EIS team for ERM/GHD and the group was listed on the final report. Another sore point is the same people were told *C. pulchellus* would be a new species even though a determination had not been finalised at that time, but I am only an amateur. Despite this, the sub-division plans did not recognise its presence and we now have the situation where all plants are situated within the boundaries of two of the 604 house blocks, without any status. I realise without any status these plans are not required to accommodate *C. pulchellus* but I am disappointed (but not surprised) no provision was made to plan for the inevitability of a listing but as most blocks are expected to sell for $200,000 or more, the planners would be expected to maximise the allotted area.

The main concern now is for the future as 58% of existing vegetation on the site will be removed for housing, amounting to approximately 50 hectares of good bush land. In addition to the already listed Threatened Species, there are other terrestrial orchids on the site and *Rhizanthella slateri* occurs less than 500 metres distant on another site. Stockland have regularly stated they will be on this site for the long haul (50 years) and as such the DEWR have imposed a series of conditions upon them in regard to *P. affine* and its habitat, adjacent to the Regional Shopping Complex. Consent for this complex has not yet been granted and will be under the scrutiny of the DEWR and any clearing must be in accordance with the DECC. With the development of the most recent plans I feel a little better than at any time since 2001 in regard to the long-term security of *P. affine* and *C. hunteriana* on this site. It is now 10 years since I became involved with this site and the last six have been occasionally intense and acrimonious but most of all an important learning experience.

So is this the final solution?

Only formally described in March 2007 *Calochilus pulchellus* was in serious trouble when the New South Wales Government gave consent late in 2006 to the Stockland development at Vincentia. As soon as the description was published a nomination was completed for its listing as a Vulnerable Species under the NSW *Threatened Species Conservation Act 1995* (TSC Act). Unfortunately these events were overtaken by the approval for the residential development by both the state and federal governments, as the latter approval was made public in the last days of July 2007. The problem was obvious as at that time 5 of the 25 known plants occurred on this site.

No sooner than the public release of development consent I received a phone call from Michael Drum, the Stockland manager in charge of this development. We met the next day for a talk and I put forward a proposal to rescue the population. I was referred to Mark Klein, the Civil Engineer on site and met with him the following day at the orchid site. In the meantime I had contacted John Briggs of the (DECC) in Queanbeyan, to ask for his assistance with the proposed translocation of all plants. He agreed to help but was unable to do so until the last two days in August. This difficulty was put to Mark and he agreed to wait until then. The sense of urgency was real as this was the first stage of development and work was to begin immediately. We met on a Wednesday, machinery was assembled by Friday, a site office was installed during the weekend and clearing commenced the following Monday.

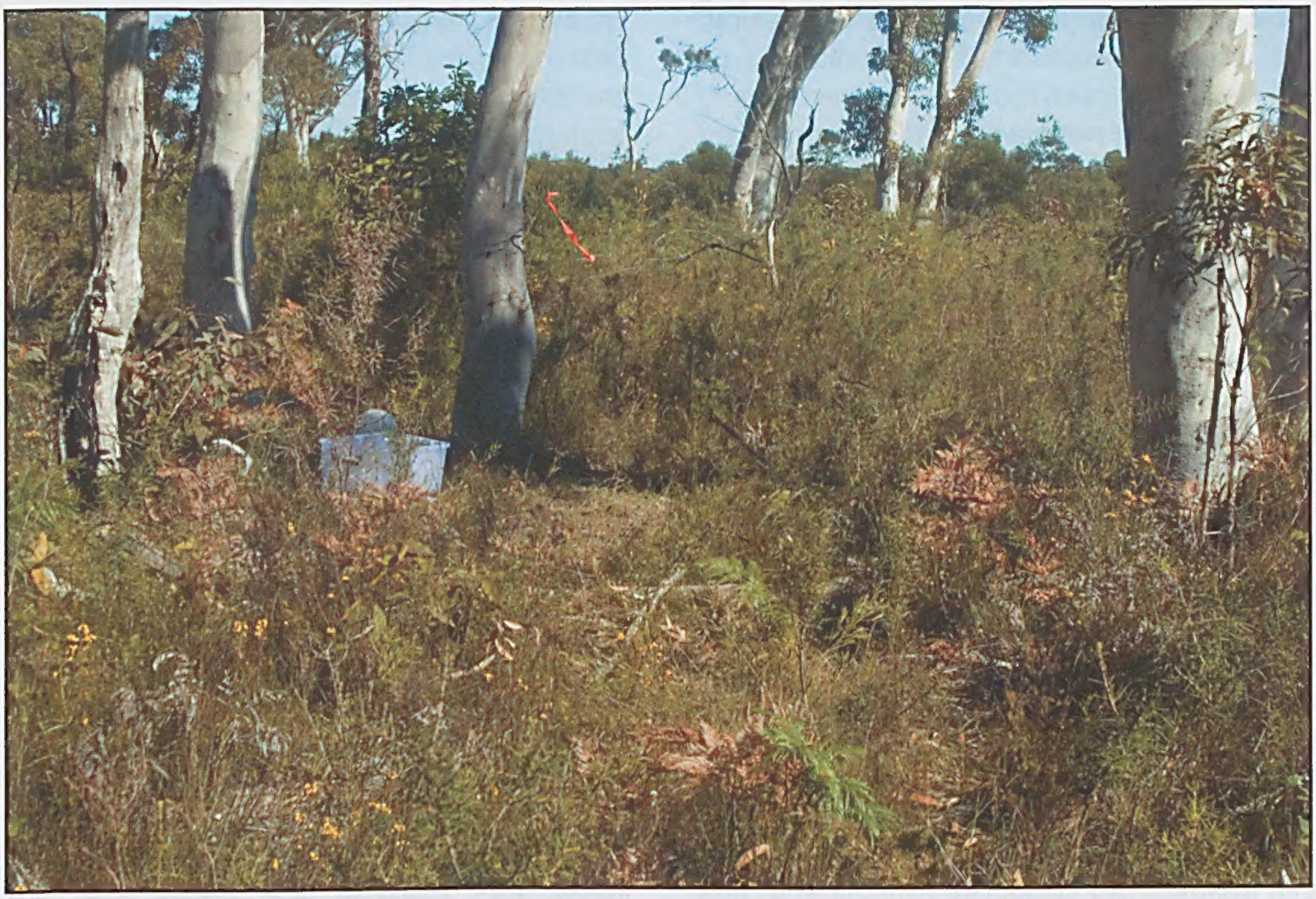
I had initially located four plants in November 2004 and despite the drought, one of these plants also flowered in 2005. I again visited the site in 2006 and was amazed to find an individual plant in flower in a tree stump. This plant became the focus of an article in my local Newspaper. Meeting Mark at this stump in early August, I noted the same stump dwelling plant had produced a new leaf and appeared quite healthy. I was further surprised to note numerous seedlings in the ground around the stump, obviously produced from the capsules of the 2006 flowering. In total there were seven leaves and from two of these a flowering stem was apparent in addition to the plant in the stump. Just what I needed, a growing population about to suffer the indignity and uncertainty of being uprooted and relocated. These plants were in two groups of three and a larger individual. At this time a barrier was erected around both populations to protect them from the large number of machines designed to uproot trees and clear vegetation. I am pleased to say that all on-site people were most co-operative and more than a little surprised at my concerns about a few small orchids. However, when informed the entire population (including recent additions) was still limited to a paltry 32 plants, some recognition of the situation was expressed.

To further illustrate the plight of this and many other species of flora and fauna, the current number considered to be under threat, has risen from 962 in 2005 to 1013 in 2007. This includes all flora and fauna but is for NSW only and with numbers continuing to rise, bragging rights are not contested. *C. pulchellus* is not yet listed as either vulnerable or endangered but I feel certain it will be listed before the end of 2007.

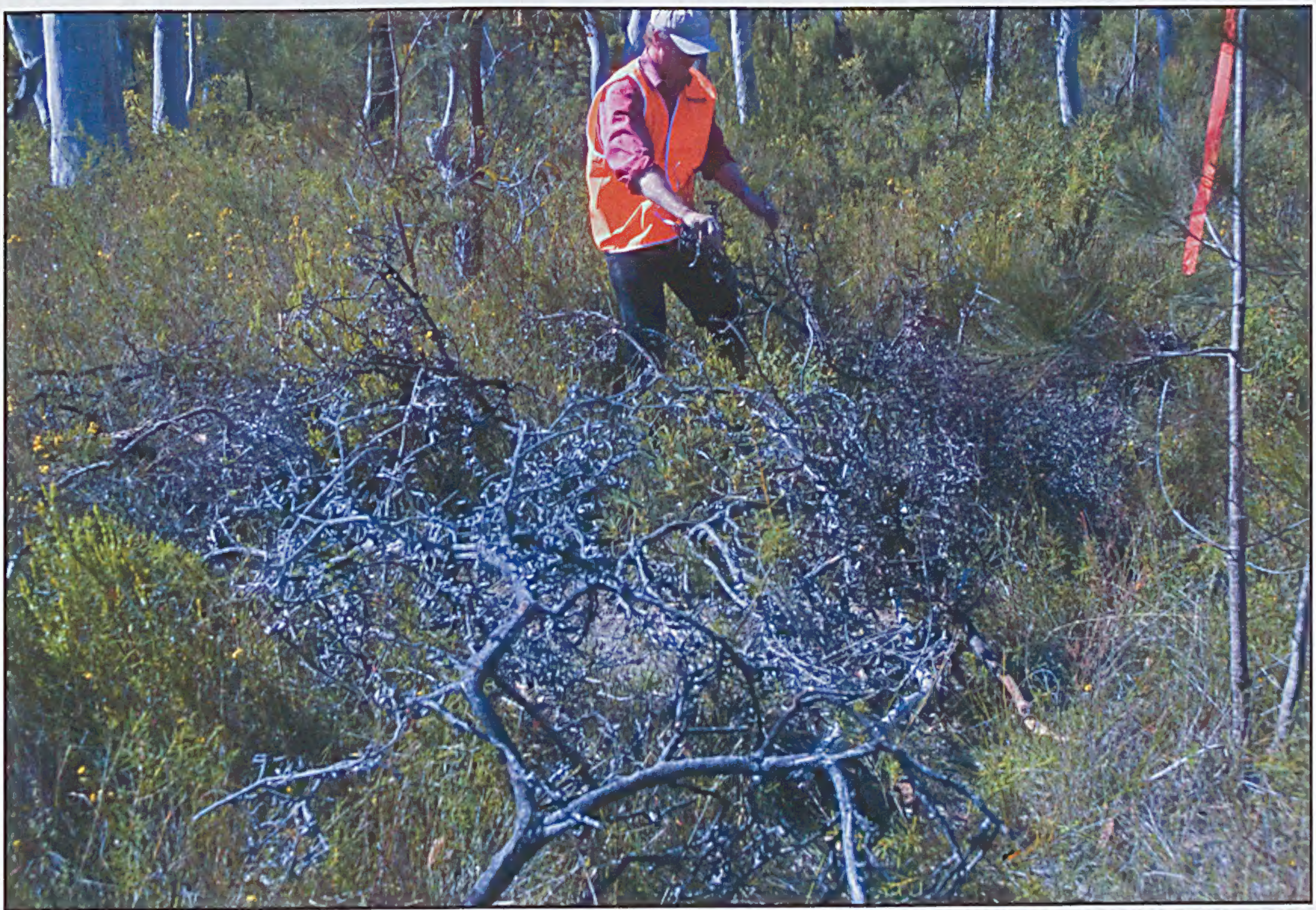
During the time arrangements were being made to translocate the orchids, I visited my local Newspaper on an unrelated matter and was contacted during this visit by Damian McGill the photographer who

Alan Stephenson with extracted orchids in containers ready for the trip to the new site.

Main clearing site to the north Vincentia.



Translocation site nearest to Leisure Centre, Vincentia.



John Briggs applying kangaroo proofing to translocation site at Vincentia.

Photos Alan Stephenson

took photos of the orchid in the stump the previous season. We spoke about the severe impact the development would have on the bushland and I mentioned the rescue attempt. He then asked if he could get access at that time for another story. This was not easy to achieve as I discovered after contacting Michael Drum to ask for this to be allowed. He did however manage to convince Stockland corporate people a positive story would result from a rescue operation. On the day of the translocation we attended the site to undergo the induction process necessary for the purposes of Occupational Health and Safety, which seems to rule all workplaces in this modern world. We were issued with hard hats and high-visibility vests and proceeded to the orchid site. John Briggs and I first assessed the number of extractions necessary and then explored all sections of the Environmental Zone (EZ) to select suitable sites for translocation. We decided to spread the orchids over five sites to give them the best chance possible to survive. Translocation of orchid species of this type (greatly fungal reliant) is not an option I would normally choose, however under the circumstances I could not allow them to be bulldozed without making a serious effort. As this species is rare and limited to four known sites with populations of one, one, five (now 12) and 18 it is certainly selective in its choice of habitat and no positive information is available as to a pollinator.

The choices we made for the new sites were based on similar vegetation, sunlight availability and soil type and moisture content but all of this was slightly educated guesswork. The soil at the stump was quite dark and rich looking but none of the selected sites was exactly identical, although all were similar.

Removal of the plants was not easy as both groups of three were among the roots and when the soil plugs were lifted we noted one tuber in each group was situated hard against the roots of the stump and as such when lifted were exposed to the elements, although none were damaged. After lifting the plugs they were placed in containers and more loose soil was packed around the plug to retain moisture and prevent movement during transport to the new site. The transport distances were less than one kilometre on a road suitable only for a slowly driven four wheel drive vehicle. The initial transport included both groups of three and the single plant at the base of the stump. The plant in the stump and that from the original site were removed and transported later in the day.

At the new sites a suitable sized hole was dug, with loose soil from the host site placed at the bottom, as it was hoped the plants would benefit from any mycorrhiza from the original site. The plug was gently lowered and placed at the same angle at ground level and more original soil was used to fill any vacant space. The plants were then watered with water collected from the site and a numbered metal stake was placed near the plant as a record and location point. Final touches were the placing of wooden stakes on a north-south line, each stake situated two metres from the relocated orchids and the positioning of a barrier of dead shrubs to prevent Kangaroos from accessing the orchids, either by accident or design. A GPS point was then recorded for each orchid plot. At each site two plots approximately 20 metres apart were constructed far enough from any road or track so as not to be visible. The containers used were 32 litre capacity plastic storage boxes and with the plug containing the orchid/s and loose soil for packing, each container weighed approximately 25kg at the time of transport.

Originally it was intended to remove the entire stump with the orchid intact but a decision was made to cut a large wedge section from the stump using a chain saw, provided by a machinery operator from the contractor's workforce. This proved successful (and heavy) and the stump was relocated on its own in another section of the EZ. It was sunk into the earth at a depth of 20 cm to retain moisture and provide greater stability. This was treated the same as the previously translocated plants, with water, protective barrier and GPS point. By the time all plants were finally relocated we realised we had spent nine hours on this project. As I live within 30 km of the site I am able to monitor any progress on a regular basis. The hope is those orchids with emerging flower stems will be able to complete their flowering regime and manage to attract a pollinator.

All of the above has been done in the hope of saving 28% of the known population of *C. pulchellus* but in reality, luck and prevailing good weather conditions will be as much help as any orchid knowledge we were able to provide. As previously stated, this operation is not the preferred option but at the time the only option available and what was achieved was achieved with the co-operation of those involved on both sides of the ideological equation.

As I finish writing this article I have been contacted by Michael Drum and invited to attend a small scale ceremony to mark the initiation of work on the residential estate. I accepted, albeit reluctantly as I find it difficult to look at so much previously good bushland disappearing so rapidly. Further to this I have learned the stated 58% of bush to be removed has now been increased. It appears the hollow trees used by birds and animals as habitat are to be reduced in number as they are considered by the Shoalhaven City Council to be a danger to future residents. The estimate of lost habitat is now at approximately 70%. This action only serves to illustrate the lack of environmental ethic within the political and bureaucratic arms of council and perhaps readers can now understand my continued dislike and distrust of this body.

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Tourist Road, orchids slashed by SCA.

There are well known populations of rare Orchids along Tourist Road, Kangaloon, in the Southern Highlands. The Sydney Catchment Authority, which is charged with managing the area, is well aware that there are rare Orchids and other Endangered Species present here. They have been told that by local environmentalists, and have even commissioned biologists to survey the area, as a result of that advice.

They might argue that this slashing was necessary for fire prevention. However, in previous years they have done this slashing in late winter. This year, they have done it in the height of Orchid-flowering season. This is a calamity.

With many fine Orchids in full flower this year, this is a calamity. All those plants will have had their flower heads, or seed capsules destroyed. That means none of these plants can set seed for future years. None on them.

The plants tubers will survive, but with the loss of leaves, the plants will have been weakened. If they are slashed again next year, at this time, the plants are likely to die out.

This is disastrous for the Orchids. And given that the SCA knows about these plants it is an act of wanton vandalism on their part.

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Southern Highlands Photographic Society Group trip to Kangaloon, proir to the roadside slashing. Photo Les Valentine

Orchid hunting around a drought stricken Rye Park, April 2006. Left to right - Peter, Annette, Catherine, Verdi, VJ and Graeme. Photo Peter Eygelshoven